CURRICULUM AND SYLLABI
Choice Based Credit System
Regulations 2019

B.Tech – Information Technology

Department Vision

To attain global recognition in Information Technology education and training to meet the growing needs of the industry and society.

Department Mission

Imparting quality education for the challenging needs of the IT industry with ethics and to reach the unreached through technological development. Promote new uses of Information Technology within the institution

DEPARTMENT OF INFORMATION TECHNOLOGY

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1 **Meet Market Demands :** Graduates will become a successful engineer to meet the demand driven needs of industries/technical profession

PEO 2 **Core Competence:** Graduates will demonstrate core competence in mathematical, scientific and basic engineering fundamentals necessary to formulate, analyze and solve engineering problems and/or also to pursue advanced study or research

PEO 3 **Design and Analysis:** Graduates will demonstrate good breadth of knowledge in core areas of Information Technology and related engineering so as to comprehend engineering trade-offs, analyze, design, and synthesize data and technical concepts to create novel designs in solving the real life problems

PEO 4 **Professional Responsibility:** Graduates will demonstrate professional responsibility by offering a wide spectrum of consultancy and testing services by addressing social, cultural, economic, sustainability, and environmental considerations in the solution of real world engineering problems

PEO 5 **Life-long Learning:** Graduates will engage themselves in life-long learning through independent study and by participating in professional activities or continuing education

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

PO$_a$ **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO$_b$ **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.

PO$_c$ **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.

PO$_d$ **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.

PO$_e$ **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.

PO$_f$ **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.

PO$_g$ **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.

PO$_h$ **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO$_i$ **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO$_j$ **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.

PO$_k$ **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.

PO$_l$ **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.

Checked & Verified by

(Signature with Name and Designation)

BoS Chairman
HoD / IT

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO₁ An ability to analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same in emerging technology environments like cloud computing, embedded products and real-time systems.

PSO ₂ Knowledge of data and its management techniques for data acquisition, big data, handling of data etc. and enabling students in solving problems using these techniques of data analytics like pattern recognition, knowledge discovery.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME   OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)	PROGRAMME OUTCOMES (POs)											
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
PEO 1				3				1	1	2	2	1
PEO 2	3	3	1	1								2
PEO 3			3			1						3
PEO 4			3		1	2	3	1				
PEO 5												3

1Low 2Medium 3High

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Outcomes and the Programme outcomes is given in the following Table

PROGRAMME SPECIFIC OBJECTIVES(PEO)	PROGRAMME OUTCOMES (PO)											
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
PSOa	3	2			3				2	2		
PSOb				3			3	3			3	

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
I – VIII SEMESTERS CURRICULUM
SUMMARY OF CREDIT DISTRIBUTION

S.No	CATEGORY	CREDITS PER SEMESTER								TOTAL CREDITS	CREDITS IN %	Range Of Total Credits	
		I	II	III	IV	V	VI	VII	VIII			Min	Max
1	HSS	3	2		2			3		10	6%	5%	10%
2	BS	12	4	4						20	12%	15%	20%
3	ES	7	12	6						25	15%	15%	20%
4	PC			14	21	9	12	5		61	37%	30%	40%
5	PE					6	6	6	6	24	15%	10%	15%
6	OE					6	3	3		12	7%	10%	15%
7	EEC						1		9	10		5%	10%
8	Internship / IPT /Online Courses								2	2	6%		
	TOTAL	22	18	24	23	21	22	17	15	2	164		-	-

HSS – Humanities and Social Sciences

BS – Basic Sciences

ES – Engineering Sciences

PC – Professional Core

PE – Professional Elective

OE – Open Elective

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
I – VIII SEMESTERS CURRICULUM

FIRST SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
Theory							
19GE1101	English for Professional Communication	HSS	3	0	0	3	3
19GE1201	Matrices and Calculus	BS	3	1	0	4	4
19GE1302	Physics for Information Science	BS	3	0	0	3	3
19GE1402	Chemistry for Information Science	BS	3	0	0	3	3
I9ME1502	Engineering Graphics	ES	1	0	4	3	5
19CS1502	Problem Solving & Python Programming	ES	2	0	4	4	6
19IT1311	Physics and Chemistry Laboratory	BS	0	0	4	2	4
19IT1L01	Value Education	HSS	2	0	0	-	2
		TOTAL	**17**	**1**	**12**	**22**	**30**

SECOND SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19GE2101	Technical Communication	HSS	2	0	0	2	2
19MA2203	Transforms and Fourier Series	BS	3	1	0	4	4
19EE2503	Basic Electrical and Electronics Engineering	ES	3	0	0	3	3
19CS2504	C Programming	ES	3	0	0	3	3
19IT2511	Basic Electrical and Electronics Engineering Lab	ES	0	0	4	2	4
19IT2512	C Programming Laboratory	ES	0	0	4	2	4
19IT2513	Computer Hardware and Software Tools Laboratory	ES	0	0	4	2	4
19GE2M02	Fundamentals of Computational Biology	HSS	2	0	0	-	2
19IT2M02	Technical Presentation / Seminar	EEC	2	0	0	-	2
		TOTAL	**15**	**1**	**12**	**18**	**28**

THIRD SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19IT3201	Probability & Statistics	BS	3	1	0	4	4
19IT3501	Digital Principles and System Design	ES	3	1	0	4	4
19IT3601	Computer Organisation and Architecture	PC	3	0	0	3	3
19IT3602	Data Structures & Algorithms	PC	3	0	0	3	3
19IT3603	Information Theory and Coding	PC	3	0	0	3	3
19IT3604	Object Oriented Programming	PC	2	0	2	3	3
19IT3511	Digital Laboratory	ES	0	0	4	2	4
19IT3612	Data Structures & Algorithms Laboratory	PC	0	0	4	2	4
19GE3M01	Communication and Soft Skills	EEC	0	0	2	-	2
19IT3AP1	Aptitude – I		1	0	0	-	1
	TOTAL		**18**	**2**	**12**	**24**	**31**

FOURTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19IT4601	Data Base Systems	PC	3	0	0	3	3
19IT4602	Data Communication and Computer Networks	PC	3	0	0	3	3
19IT4603	Microprocessor and Microcontrollers	PC	2	0	2	3	4
19IT4604	Operating Systems	PC	3	0	0	3	3
19IT4605	Software Engineering Methodologies	PC	3	0	0	3	3
19IT4611	Data Base Systems Laboratory	PC	0	0	4	2	4
19IT4612	Networks Laboratory	PC	0	0	4	2	4
19IT4613	Operating Systems Laboratory	PC	0	0	4	2	4
19IT4111	Interpersonal Skills Essentials	HSS	0	0	2	2	2
19GE4M01	Environmental Science and Engineering	HSS	2	0	0	0	2
19IT4AP2	Aptitude – II		1	0	0	-	1
			17	**0**	**16**	**23**	**33**

FIFTH SEMESTER

Code No.	Course	Category	L	T	P	C	H
19IT5601	Web Programming	PC	3	0	2	4	5
19IT5602	Virtualization and Cloud Computing	PC	3	0	0	3	3
	Professional Elective – I	PE	3	0	0	3	3
	Professional Elective – II	PE	3	0	0	3	3
	Open Elective I	OE	3	0	0	3	3
	Open Elective II	OE	3	0	0	3	3
19IT5611	Virtualization & Cloud Computing Laboratory	PC	0	0	4	2	4
19IT5M01	Indian Constitution	HSS	1	0	0	-	1
19IT5AP3	Aptitude – III		2	0	0	-	2
	TOTAL		**20**	**0**	**8**	**21**	**29**

SIXTH SEMESTER

Code No.	Course	Category	L	T	P	C	H
19IT6601	Data Mining And Predictive Analytics	PC	3	0	2	4	5
19IT6602	IoT Protocols and Architecture	PC	3	0	0	3	3
19IT6603	Network and Information Security	PC	3	0	0	3	3
	Professional Elective – III	PE	3	0	0	3	3
	Professional Elective – IV	PE	3	0	0	3	3
	Open Elective – III	OE	3	0	0	3	3
19IT6611	IoT and Security Laboratory	PC	0	0	4	2	4
19IT6901	Engineering Clinics – Mini Project	EEC	0	0	2	1	2
19IT6902	Internship	EEC	-	-	-	2	-
19IT6M01	Professional Communication – Advanced Reading and Writing	EEC	2	0	0	-	2
	TOTAL		**20**	**0**	**8**	**24**	**28**

SEVENTH SEMESTER							
Code No.	Course	Category	L	T	P	C	H
19IT7101	Professional Ethics for IT Engineers	HSS	3	0	0	3	3
19IT7601	Machine Learning	PC	3	0	0	3	3
	Professional Elective – V	PE	3	0	0	3	3
	Professional Elective – VI	PE	3	0	0	3	3
	Open Elective – IV	OE	3	0	0	3	3
19IT7611	Machine Learning Laboratory	PC	0	0	4	2	4
19IT7M01	Corporate Social Responsibility	HSS	2	0	0	0	2
	TOTAL		**17**	**0**	**4**	**17**	**21**

EIGTH SEMESTER							
Code No.	Course	Category	L	T	P	C	H
	Professional Elective – VII	PE	3	0	0	3	3
	Professional Elective – VIII	PE	3	0	0	3	3
19IT8911	Project Work	EEC	0	0	4	9	9
	TOTAL		**6**	**0**	**4**	**15**	**15**

L   Lecture

T   Tutorial

P   Practical

H   Hours

Code No	Course	L	T	P	C
PROFESSIONAL ELECTIVES					
PROFESSIONAL ELECTIVE I					
19IT5701	Advanced Java Programming	3	0	0	3
19IT5702	Distributed Computing	3	0	0	3
19IT5703	UNIX System Architecture	3	0	0	3
19IT5704	Discrete mathematics and applications	3	0	0	3
19IT5705	Computer Graphics and Visualization	3	0	0	3
PROFESSIONAL ELECTIVE II					
19IT5706	Wireless and Mobile Computing	3	0	0	3
19IT5707	Advanced Data Structures and Algorithms	3	0	0	3
19IT5708	Real Time Systems	3	0	0	3
19IT5709	Object Oriented Software Modelling and Design	3	0	0	3
19IT5710	Advanced Data Base Systems	3	0	0	3
PROFESSIONAL ELECTIVE III					
19IT6701	Embedded Systems Architecture	3	0	0	3
19IT6702	Computational Theory and Compilers	3	0	0	3
19IT6703	Multimedia Systems and Technologies	3	0	0	3
19IT6704	Wireless Adhoc and Sensor Networks	3	0	0	3
19IT6705	C# and .NET	3	0	0	3
PROFESSIONAL ELECTIVE IV					
19IT6706	Software Quality Management	3	0	0	3
19IT6707	Digital Signal Processing Techniques	3	0	0	3
19IT6708	Human Computer Interaction	3	0	0	3
19IT6709	Bio Informatics	3	0	0	3
19IT6710	Principles of Management	3	0	0	3
19IT6711	Network Management	3	0	0	3

Code No	Course	L	T	P	C
PROFESSIONAL ELECTIVE V					
19IT7701	Artificial Intelligence	3	0	0	3
19IT7702	Digital Image Acquisition and Processing	3	0	0	3
19IT7703	Software Architecture	3	0	0	3
19IT7704	Data Center Networks	3	0	0	3
19IT7705	Cyber Forensics	3	0	0	3
PROFESSIONAL ELECTIVE VI					
19IT7706	Soft Computing Techniques	3	0	0	3
19IT7707	Big Data Analytics and Models	3	0	0	3
19IT7708	Software Testing – Techniques and Tools	3	0	0	3
19IT7709	Web Application Security	3	0	0	3
19IT7710	Ecommerce Systems	3	0	0	3
19IT7711	Quantum Computing	3	0	0	3
PROFESSIONAL ELECTIVE VII					
19IT8701	Deep Learning Algorithms	3	0	0	3
19IT8702	Data Driven Business Intelligence	3	0	0	3
19IT8703	Multi Core Architecture	3	0	0	3
19IT8704	Agile Methodologies and Devops	3	0	0	3
19IT8705	Natural Language Processing	3	0	0	3
PROFESSIONAL ELECTIVE VIII					
19IT8706	Integrated Quality Management System	3	0	0	3
19IT8707	Software Project Management	3	0	0	3
19IT8708	Management Information Systems	3	0	0	3
19IT8709	Enterprise Resource Planning	3	0	0	3
19IT8710	Human Resource Management	3	0	0	3

PROGRAMME SPECIFIC ELECTIVE FOR EXPANDABLE SCOPE				
OPEN ELECTIVE I				
19IT5801	C Programming with Linux	3	0	0	3
19IT5802	Social Media Marketing	3	0	0	3
19IT5803	Information Technology Essentials	3	0	0	3
19IT5804	Database Programming in SQL	3	0	0	3
19IT5805	Network Technologies and protocols	3	0	0	3
OPEN ELECTIVE II				
19IT5806	Object Oriented Programming	3	0	0	3
19IT5807	Introduction to Data Analysis and Visualization with Python	3	0	0	3
19IT5808	Software Engineering practices	3	0	0	3
19IT5809	Introduction to Web Technologies	3	0	0	3
19IT5810	Cyber Security Essentials	3	0	0	3

PROGRAMME SPECIFIC ELECTIVE FOR EXPANDABLE SCOPE				
OPEN ELECTIVE III				
19IT6801	Client server computing and applications	3	0	0	3
19IT6802	Software Testing Methodologies	3	0	0	3
19IT6803	Digital Mobile Forensics	3	0	0	3
19IT6804	Computer Aided Drug Design	3	0	0	3
19I65805	Fundamentals of IoT	3	0	0	3
OPEN ELECTIVE IV				
19IT7801	Fundamentals of Machine Learning	3	0	0	3
19IT7802	Supply Chain Technology and Systems	3	0	0	3
19IT7803	Health Care Technologies	3	0	0	3
19IT7804	Block Chain Essentials	3	0	0	3
19IT7805	Creativity and Innovation in product development	3	0	0	3

VALUE ADDED COURSES					
VAC4001	Fundamentals of Computational Thinking and Coding	1	0	0	2
VAC4002	Fundamentals of Data analysis and Visualization Using Python	1	0	0	2
MANDATORY COURSES (NON CREDIT COURSES)					
19IT0M01	Induction Training (At the start of First Year)	-	-	-	-
19GE2M02	Fundamentals of Computational Biology	2	-	-	-
19GE4M01	Environmental Science and Engineering	2	-	-	-
19IT5M01	Indian Constitution	1	-	-	-
19IT7M01	Corporate Social Responsibility	2	-	-	-
EMPLOYABILITY ENHANCEMENT COURSES					
19IT2M02	Technical presentation/Seminar	2	-	-	-
19GE3M01	Communication and Soft skills	-	-	2	-
19IT6M01	Professional Communication – Advanced Reading and Writing	2	-	-	-

*The list of open electives, Value added courses; mandatory courses will be updated time to time.

Guidelines for Aptitude Course

Aptitude Assessment consists of two phases,

In the first phase, half of the portions will be taught and assessed through FAT I (Formative Assessment Test I). The assessment method may be either online or offline.

In the second phase, next half of the portions will be taught and assessed through FAT II (Formative Assessment Test II). The assessment method may be either online or offline.

Assessment guidelines for Aptitude

FAT I: This will be conducted at the end of the first phase, for 50 Marks, consists of 25 Multiple choice questions each carrying 2 marks.

FAT II: This will be conducted at the end of the second phase, for 50 Marks, consists of 25 Multiple choice questions each carrying 2 marks.

Final Gradings: It will be provided as total of FAT I and II marks.

Checked & Verified by   BoS Chairman
(Signature with Name and Designation)   HoD / IT

MANDATORY NON CGPA COURSES

19NC0M01   **National Service Scheme (NSS)**

1.	Pre –requisites/ Eligibility Conditions	-
2.	Detail of Course Content /Syllabus	
3.	Duration of the Course	Before 7th Semester
4.	Assessment Procedure	-
5.	Criteria for allocation of credit	Attend one orientation programme andparticipation certificate for 75 contact hours/year and participation certificate in 2 activities
6.	In case of failure	-

19NC0M02   **National Sports Organization**

1.	Pre –requisites / Eligibility Conditions	-
2.	Detail of Course Content / Syllabus	As prescribed by the Physical Education department
3.	Duration of the Course	50 Hours per Year Minimum contact hours required – 38 Hours per Year
4.	Assessment Procedure	As decided by the Physical Education department
5.	Criteria for allocation of credit	Participation in Ties / Zone / Inter Zone / Open Tournament or representation in intramural Sports &Games with 75% attendance in ground practice / Pass on Examination conducted by Physical Education department.
6.	Incase of failure	(If the students core less than 50 marks in the above criteria)Repeat the course

19NC0M03   **Youth Red Cross (YRC)**

1.	Pre –requisites / Eligibility Conditions	-
2.	Detail of Course Content /Syllabus	Periodical meetings, Blood Donation Camp, Orphanage visit, Awareness Programmes , Test related to YRC(Multiple Choice Questions)
3.	Duration of the Course	One year
4.	Assessment Procedure	Evaluation will be based on attending periodical meetings (Attendance) / Camp / Orphanage visit / Test / Awareness Programmes
5.	Criteria for allocation of credit	Participation certificate in 2 activities
6.	Incase of failure	-

19NC0M04   **Yoga for Empowerment**

1.	Pre –requisites/ Eligibility Conditions	As prescribed by Yoga class practitioners
2.	Detail of Course Content /Syllabus	
3.	Duration of the Course	60 Hours per Year. Minimum contact hours required – 45Hours per year
4.	Assessment Procedure	-
5.	Criteria for allocation of credit	Completion certificate issued by the Yoga Club / Yoga class practitioners
6.	Incase of failure	-

19NC0M05 **Aptitude Proficiency Certification**

1.	Pre –requisites/ Eligibility Conditions	As prescribed by the course coordinator
2.	Detail of Course Content / Syllabus	
3.	Duration of the Course	40 periods with minimum 70% of attendance
4.	Assessment Procedure	As prescribed by the course coordinator
5.	Criteria for allocation of credit	Pass in End Examination / Minimum score in GMAT/CAT /NAC/MAT
6.	Incase of failure	Repeat the course

19NC0M06 **Critical and Creative Thinking**

1.	Pre –requisites/ Eligibility Conditions	Prior permission from the HOD is must
2.	Detail of Course Content /Syllabus	Refer **Annexure-IV**
3.	Duration of the Course	15 Hours
4.	Assessment Procedure	As per the procedure specified for theory courses
5.	Criteria for allocation of credit	Proof for the successful completion of the course provided by the course instructor
6.	In case of failure	---

19NC0M07   **English Proficiency Certification**

1.	Pre –requisites/ Eligibility Conditions	As prescribed by the certifying authority
2.	Detail of Course Content / Syllabus	
3.	Duration of the Course	
4.	Assessment Procedure	
5.	Criteria for allocation of credit	A certificate for attending BEC course / Minimum score in TOFEL iBT / GRE/IELTS
6.	In case of failure	Repeat the course

19NC0M08   **Foreign/Vernacular Languages**

1.	Pre –requisites/Eligibility Conditions	-
2.	Detail of Course Content /Syllabus	As prescribed by the course conducting Universities / Schools
3.	Duration of the Course	
4.	Assessment Procedure	
5.	Criteria for allocation of credit	Pass certificate issued by the competing authority
6.	In case of failure	Repeat the course

19NC0M09   **Globally Accepted Certification Courses**

1.	Pre-requisites /Eligibility Conditions	Prior permission from the HOD is must
2.	Detail of Course Content / Syllabus	As prescribed by the certifying authority
3.	Duration of the Course	
4.	Assessment Procedure	
5.	Criteria for allocation of credit	Proof for the successful completion of the course provided by the globally accepted certifying agencies like HPATA / Microsoft / National Instruments (Lab View) / Oracle / IBM / CISCO Networking Academy / ADOBE / REDHAT / Sun Microsystems JAVA/ Softwares related to Mechanical and Civil Engineering
6.	Incase of failure	-

19NC0M10   **Soft skills**

1.	Pre –requisites/ Eligibility Conditions	Completion of 2nd semester
2.	Detail of Course Content /Syllabus	As prescribed by Training and Skill Development
3.	Duration of the Course	-
4.	Assessment Procedure	-
5.	Criteria for allocation of credit	Successful completion of Soft skill Training with minimum 20 contact hours
6.	Incase of failure	-

INDUSTRIAL TRAINING/INTERNSHIP

Industrial Training

1.	Pre –requisites/ Eligibility Conditions	After completion of the third semester. The student may undergo Industrial training in reputed organization after getting prior permission from HOD
2.	Detail of Course Content / Syllabus	Inplant training in any organization like BSNL,TTPS, BHEL, NLC etc., related to their programmes
3.	Duration of the Course	As in Table 4
4.	Assessment Procedure	1. Student has to submit a report. 2. Evaluation Committee will be constituted by the respective department HOD to assess the report based on the following criteria"s. Evaluation of report given by the student(40%)
5.	Criteria for allocation of credit	Satisfactory completion certificate issued by the respective department HOD based on the performance of the student and a certificate from the organization
6.	In case of failure	-

Internship

1.	Pre –requisites / Eligibility Conditions	After completion of the third semester. The student may undergo intensive training after getting prior permission from HOD

2.	Detail of Course Content / Syllabus	Internship Training in R&D organization like CSIR, DRDO, IITs and IISC etc related to their programmes
3.	Duration of the Course	As in Table 4
4.	Assessment Procedure	1. Student has to submit a report for Internship 2. Evaluation Committee will be constituted by the respective department HOD to assess the report based on the following criteria``s . • Internship Report(40%) • Student"s presentation(40%)
5.	Criteria for allocation of credit	Satisfactory completion certificate issued by respective department HOD based on the performance of the student and a certificate obtained from the organization concerned.
6.	Incase of failure	-

19NC0M06   CRITICAL &CREATIVE THINKING   CREDIT:1

Course Outcome:

CO1 :After completing the course the students will be critical thinkers and creative problem solvers by generating new ideas.

Creativity is not an external force or rare skill, it is a habit that can be learned and exercised every day. This course challenges preconceived notions about creativity and provides valuable tools that will unlock this skill to help you generate better ideas faster. We will lead you through few short, fun exercises that will bring little creativity and will also bring out your hidden thinking skills that you might not have realized before.

INTRODUCTION

Types of Human Thinking

Remembering and Recalling - Understanding - Applying - Analyzing - Evaluating Creating -

Opposing - Categories of Typesof Thinking, Vertical vs.Lateral Thinking -Concrete Thinking vs. Abstract Thinking - Convergent Thinking vs. Divergent Thinking - Logical vs. Analytical Thinking - Creative Thinking vs. Analytical Thinking - Sequential (linear) Thinking vs. Holistic Thinking - Errors in thinking -Partialism - Adversary Thinking - Time scale error - Initial Judgement - Arrogance and Conceit.

Thinking Formula

AIMS Goals Objective - Consider all factors - Plus Minus Interesting - Other Peoples View - Alternatives Possible choices.

CRITICAL THINKING SKILLS

Interpretations Skill - Analysis, Skill - Inference Skills – Evaluation – Explanation - Self Regulation Skills.

CREATIVE THINKING &INNOVATION

Creative vs. Critical Thinking - Creativity vs. Innovation - Invention vs. Innovation - Creativity and Innovation in Entrepreneurship - Creative Team and Collaborative Thinking - Exploring Innovation and Creativity within Organizations.

DESIGN THINKING

What is Design Thinking - Design thinking process: Empathy understanding of Problem, Define the problem, Ideate (Generating new ideas for Problem Solving), Prototype, Test.

IDEATION TOOLS AND METHODS

Brain storming - Reverse Brainstorming - Mind mapping tool - SWOT Analysis – SCAMPER method.

B. TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
I SEMESTER

FIRST SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
Theory							
19GE1101	English for Professional Communication	HSS	3	0	0	3	3
19GE1201	Matrices and Calculus	BS	3	1	0	4	4
19GE1302	Physics for Information Science	BS	3	0	0	3	3
19GE1402	Chemistry for Information Science	BS	3	0	0	3	3
I9ME1502	Engineering Graphics	ES	1	0	4	3	5
19CS1502	Problem Solving & Python Programming	ES	2	0	4	4	6
19IT1311	Physics and Chemistry Laboratory	BS	0	0	4	2	4
19IT1L01	Value Education	HSS	2	0	0	-	2
	TOTAL		**17**	**1**	**11**	**22**	**30**

19GE1101   ENGLISH FOR PROFESSIONAL COMMUNICATION   L T P C
**   3 0 0 3**

OBJECTIVES:

1. To widen the basic reading and writing skills of first year Engineering and Technology students.
2. To develop listening skills, and enhance the ability of comprehending.
3. To hone speaking skills and speak confidently in real life situations.
4. To master vocabulary both General and Technical.
   To draft letters and write abstracts.

PRE-REQUISITE:

   The pre-requisite knowledge required by the Students to study this Course is basic knowledge in English Language.

UNIT I   SHARING INFORMATION   9

Reading- Short Comprehension Passages – Day-to-day conversation; Writing- Reframing sentences from the jumbled words – Creating Coherence; Listening- Listening to TED talks, texts, short formal and informal conversations;   Speaking- introducing oneself to the audience giving importance to characteristics, strengths and weaknesses;   Language development- Framing Yes/No questions, Question tag, Vocabulary development - Formation of words– verb – Noun – Adjectives, standard abbreviations

UNIT II   READING AND WRITING I   9

Reading – Extensive Reading - short narratives and news items from newspapers; Writing – Sentence structure - short passages on the working principle of any gadget, describing an Electronic/ mechanical gadget, importance of punctuation, organizing paragraphs; Listening- Listening to telephonic conversations and Lectures by native speakers; Speaking- introducing a device to the audience – specifications, descriptions, merits and demerits. Language development – Framing „Wh‟ Questions, Writing a complete sentence using the fragments given. Vocabulary development- Prefix and suffix.

UNIT III   READING AND WRITING II   9

Reading- Comprehensive Reading – Technical Passages; Writing - Rearranging Jumbled Sentences, Writing Short Essays; Listening – listening to short English episodes and filling in the blanks – cloze test. Speaking- asking for opinions using do/does; Language

development – Direct Speech and Indirect Speech – Framing Indirect Questions - Vocabulary development – Select single word substitute, Prepositions, Articles

UNIT IV   DEVELOPING LETTER WRITING SKILLS   9

Reading- Comprehending Articles from magazines, understanding the writing style - Writing- letter writing – Job Application – Resume; Listening- listening to dialogues or conversations and completing exercises based on them; Speaking - Language development- Tenses- simple present - simple past- present continuous and past continuous- Vocabulary development- synonyms, antonyms, phrasal verbs.

UNIT V   EXTENDED WRITING   9

Reading- Comprehending Articles from Journals –Writing- Writing Abstracts – developing an outline - identifying main and subordinate ideas - dialogue writing – enquiring about a product. Listening – listening to Technical Talks – Note Making - Speaking – participating in conversations- Short Group Discussions – phrases used during discussions - Language development - modal verbs - present/ past perfect tense - Vocabulary development - fixed and semi-fixed expressions.

TOTAL HOURS: 45

TEXT BOOK(S)
1. Butterfield, Jeff. Soft Skills for Everyone. Cengage Learning: New Delhi,2017.
2. Richards C. Jack and David Bohleke. Speak Now 3. Oxford Press 2012

REFERENCE(S)
1. Bailey, Stephen. Academic Writing: A Practical guide for Students, New York: Rutledge,2011.
2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
3. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.
4. Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.
5. Bhatnagar, Nitin and Mamta Bhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

COURSE OUTCOMES:
CO101. 1   Listen and comprehend lectures and talks in their area of specialization successfully.

CO101. 2   Read technical texts and write area- specific texts effortlessly.

CO101. 3   Speak appropriately and effectively in varied formal and informal contexts.

CO101. 4   Write winning job applications and good abstracts.

CO101. 5   Write abstracts and technical articles.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO101. 1				2			3		3	3	2	2
CO101. 2				2			3		2	3	3	2
CO101. 3				1			1		1	3	3	1
CO101. 4				2			2		2	2	3	3
CO101. 5				3			3		3	3	3	3

1Low 2Medium 3High

19GE1201   MATRICES AND CALCULUS   **L T P C**
                                                          3 1 0 4

OBJECTIVES:

1. To apply advanced matrix knowledge to Engineering problems.

2. To equip themselves familiar with the functions of several variables.

3. To familiarize with the applications of differential equations.

4. To improve their ability in solving geometrical applications of differential calculus problems.

5. To have knowledge in simple integrals.

PRE-REQUISITE:

 To study this course the students should have the basic knowledge on Matrices, Differentiation and Integration.

UNIT I   MATRICES   9+3

Characteristic equation – Eigen values and Eigen vectors of a symmetric and non symmetric matrices – Properties of Eigen values of a real matrix - Cayley _ Hamilton theorem and applications of Cayley Hamilton theorem .

UNIT II   FUNCTIONS OF SEVERAL VARIABLES   9+3

Function of two variables – Partial derivatives– Taylor"s expansion of two variables – Maxima and Minima without constraints –Jacobians and its properties – Euler"s theorem for homogeneous function.

UNIT III   ORDINARY DIFFERENTIAL EQUATIONS   9+3

Linear equations of second order and higher order with constant and variable coefficients – Homogeneous equation of Euler type – Legendre"s equations   – Methods of Variation parameter.

UNIT IV   GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS

9+3

Curvature – Radius of Curvature for Cartesian and polar coordinates – Centre of Curvature Cartesian coordinates – Circle of curvature – Involutes and Evolutes.

UNIT V   INTEGRAL CALCULUS   9+3

Methods of integration – Substitution rule – Integration by parts – bernoulli formula for integration – Definite integrals and its properties-Solving problems using Reduction formula.

TOTAL HOURS: 45+15

TEXT BOOKS(S):

1. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015.

REFERENCE(S):

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley & Sons. Singapore, 10th edition, 2012
2. K.Ganesan, Sundarammal Kesavan, K.S.Ganapathy Subramanian & V.Srinivasan, "Calculus and Solid Geometry", Revised Edition, 2013
3. Veerajan. T, Engineering Mathematics I, Tata McGraw Hill Publishing Co, New Delhi, 5th edition, 2006.
4. Kandasamy P etal. Engineering Mathematics, Vol.I (4th revised edition), S.Chand &Co., New Delhi, 2000.
5. Venkataraman M.K., Engineering Mathematics – First Year (2nd edition), National Publishing Co., Chennai, 2000

COURSE OUTCOMES:

CO102. 1   Make them to understand the fundamental knowledge of Eigen values and Eigen vectors.

CO102. 2   Make them to apply differentiation to solve maxima and minima problems.

CO102. 3   Make them to apply various techniques in solving differential equations.

CO102. 4   Make them to apply geometrical application in evolutes and involutes.

CO102. 5   Make them to evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO102. 1	1		2						2			
CO102. 2	2								2			3
CO102. 3		2										
CO102. 4	1		2						1			2
CO102. 5		2	1									

1Low 2Medium 3High

19GE1302   PHYSICS FOR INFORMATION SCIENCE   **L T P C**

   3 0 0 3

OBJECTIVES:

The course will enable students to:

1. Understand the conduction mechanism of conducting materials.
2. To enhance the fundamental knowledge in and semiconducting materials
3. Become proficient in magnetic properties.
4. To familiarize the basic concept of Laser and its application.
5. Understand the basic knowledge of fiber optics.

PRE-REQUISITES:

 Basic knowledge about different kinds of materials, laser and fibre optics.

UNIT I   CONDUCTING MATERIALS   9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures –Quantum free electron theory: Postulates, merits and demerits– Fermi- Dirac statistics – Density of energy states- Average energy.

UNIT II   SEMICONDUCTING MATERIALS   9

Intrinsic Semiconductors – Energy band diagram – elemental and compound semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors – Carrier concentration in N-type & P-type semiconductors — Hall effect and devices.

UNIT III   MAGNETIC PROPERTIES OF MATERIALS   9

Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – Ferrimagnetism – Ferromagnetism: Domain Theory- M versus H behavior – Hard and soft magnetic materials – examples and uses-– Magnetic principle in computer data storage – GMR sensor.

UNIT IV   LASER   9

Energy levels - Principle of laser - Characteristics of laser radiation - Population inversion - Optical pumping - Pumping mechanisms - Types of laser - CO2 laser – Semiconductor Laser : Homo junction and Hetero junction laser - Applications of laser: optical data storage and retrieval techniques in CD-ROM - Holography: principle -Types - Comparison of holography with photography - Construction and reconstruction of hologram.

UNIT V   FIBER OPTICS   9

Principle of fiber optics - conditions to achieve total internal reflection - Structure of an optical fiber -expressions for Acceptance angle and Numerical aperture - Types of optical fiber based on material, propagation modes and refractive index profile: single mode and multi mode optical fiber, step index and graded index optical fiber - fiber optic communication system - merits of fiber optic communication system over conventional communication systems..

TOTAL HOURS : 45

TEXT BOOKS(S):

1. Jasprit Singh, ―Semiconductor Devices: Basic Principles, Wiley 2012.

2. Kasap, S.O. ―Principles of Electronic Materials and Devices, McGraw-Hill Education, 2007.

3. Dr. P. Mani, Dhanam Publication "Engineering Physics

4. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.

REFERENCE(S):

1. Garcia, N. Damask, A. ―Physics for Computer Science Students. Springer-Verlag, 2012.

2. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.

3. Murugavel, S. Senthilkumar, G. – Materials Science, VRB Publishers Pvt. Ltd, New edition, 2017

4. Palanisamy P K, Physics for electronics and information science. Dipti Press Pvt. Ltd. 2018.

COURSE OUTCOMES:

CO103. 1   Understand the concept in classical and quantum electron theories

CO103. 2   Understand the concept based on semiconducting materials and its applications in various devices

CO103. 3   Analyze the magnetic properties of materials and their applications in data storage

CO103. 4   Apply the concepts of Laser in its application.

CO103. 5   Understand the fiber optic communication system.

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO103. 1	3	3		2								2
CO103. 2	3	3		2								2
CO103. 3	3	3		2								2
CO103. 4	3	1		2								2
CO103. 5	3	1		2								2

1Low 2Medium 3High

19GE1402   CHEMISTRY FOR INFORMATION SCIENCE   L T P C
3 0 0 3

OBJECTIVES:

1. To make the students conversant with the principles of electrochemistry.

2. To understand the properties and applications of storage materials.

3. To make the students conversant with the principles and generation of energy in batteries.
4. To acquaint the students with the basics of nano materials, their properties and applications.
5. To know about the impact and recycling of e-waste.

PRE-REQUISITE:

▯ Basic theoretical concepts of Chemistry in higher secondary level.

UNIT I   ELECTROCHEMISTRY   9

Electrochemical cell - redox reaction - cell potential - determination of potential. electrode potential- origin of electrode potential- oxidation potential- reduction potential, measurement and applications - electrochemical series and its significance - Nernst equation (derivation and problems).

UNIT II   MATERIALS FOR DATA STORAGE AND SMART SCREEN   11

Classification - magnetic storage [Iron oxide, cobalt alloy, chromium oxide and barium ferrite] - optical storage [photochromic materials] - solid storage. Conductive components: Indium tin oxide [properties and applications] - touch screen [resistive and capacitive]. Chemical components in glass - alumino silicate - gorilla glass.

UNIT III   STORAGE DEVICES FOR COMPUTERS   9

Batteries - types: Primary battery [Zinc-carbon]. Secondary battery: lead acid. Modern battery: lithium polymer battery and fuel cells (H_2-O_2 fuel cell).Super Capacitors.

UNIT IV   NANO MATERIALS   9

Introduction to Nanotechnology -Characterisation and Properties of Nanomaterials - Nano chips - types of material - properties - applications. Carbon nanotubes –fullerene, graphene : Types and applications.

UNIT V   E-WASTE MANAGEMENT   7

Sources - toxicity due to hazardous substances - impact to environment. E-waste management- Hazardous materials recycling (Gallium, Arsenic, etc.,).

TOTAL HOURS:: 45

TEXT BOOKS(S):

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015

REFERENCE(S):

1. Smart Materials Taxonomy, Victor Goldade, Serge Shil'ko, Aleksander Neverov, CRC publication, 2015

2. Recent Advances of Flexible Data Storage Devices Based on Organic Nanoscaled Materials- Li Zhou, Jingyu Mao, Yi Ren, Su-Ting Han, V A. L. Roy and Ye Zhou, Small 2018, 1703126

3. S. Vairam, Engineering Chemistry, II Edition, John Wiley & sons, New Delhi 2014.

WEB RESOURCES:

1. https://www.dmccoltd.com/english/museum/touchscreens/technologies/projected.asp

COURSE OUTCOMES:

CO104. 1   Understand the principles of electrochemistry.

CO104. 2   Gain knowledge about the properties and applications of storage materials.

CO104. 3   Understand the recent trends in electrochemical energy storage devices.

CO104. 4   Understand the basics of nano materials, their properties and applications.

CO104. 5   Identify the impact and recycling of e-waste.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO104. 1	1	2	2						1			2
CO104. 2	2	2										1
CO104. 3	3	2	2									1
CO104. 4	4	2	2									1
CO104. 5	5	2	2					1	2			2

1Low 2Medium 3High

19ME1502   ENGINEERING GRAPHICS   **L T P C**
1 0 4 3

OBJECTIVES:

1. To develop graphic skills in students.

PRE-REQUISITES:

⬚ Basic knowledge on geometry and Conics

12

UNIT I   PLANE CURVES

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method –

Construction of cycloid – Construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT II   PROJECTION OF POINTS AND LINES   12

Principles of projection, projection of points in four quadrants – Projection of straight lines located in the first quadrant – inclined to both planes – Determination of true lengths and true inclinations by rotating line method and traces

UNIT III   PROJECTION OF SOLIDS   12

Projection of simple solids like Prisms, Pyramids, Cylinder and Cone when the axis is inclined to one reference plane.

UNIT IV   SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES   12

Sectioning of above solids in simple vertical position by cutting planes inclined to HP and perpendicular to VP – Obtaining true shape of section - Development of lateral surfaces of simple and sectioned solids – Prisms, Pyramids, Cylinder and Cone.

UNIT V   ISOMETRIC AND PERSPECTIVE PROJECTIONS   12

Principles of isometric projection – isometric scale – isometric projections of truncated Prisms, Pyramids, Cylinder and Cone. Perspective projection of simple prism, pyramid and cylinder   by   Visual   ray   method

TOTAL HOURS: 60

TEXT BOOKS(S):

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited (2016)
2. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2015)

REFERENCE(S):

1. Kumar M.S., "Engineering Graphics", D.D. Publications, (2015)
2. Shah M.B. and Rana B.C., "Engineering Drawing", Pearson Education (2009)
3. Gopalakrishna K.R., "Engineering Drawing" (Vol. I & II combined), Subhas Stores, Bangalore, (2007)
4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008)
5. Parthasarathy N.S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, (2015)

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets

2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering

3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings

4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings

5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods

Special points applicable to end semester examination on Engineering Graphics:

1. There will be five questions in the end semester examination

2. All questions will carry equal marks of 20 each making a total of 100

3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size

4. The end semester examination will be conducted in two sessions (FN and AN on the same day) for 50 percent of student (approx) at a time

COURSE OUTCOME(S):

CO105. 1   Construct plane curves

CO105. 2   Draw the projections of points and lines

CO105. 3   Draw the projections of simple solids

CO105. 4   Draw the sectional views of solids and the applications of development of surfaces

CO105. 5   Construct isometric and perspective projections

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO105. 1	3								2			3
CO105. 2	3								2			3
CO105. 3	3								2			3
CO105. 4	3								2			3
CO105. 5	3								2			3

1Low 2Medium 3High

19CS1502   PROBLEM SOLVING & PYTHON PROGRAMMING   L T P C
                                                                        2 0 4 4

OBJECTIVES:

1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and call them.
4. To use Python data structures –- lists, tuples, sets and dictionaries
5. To work with files.

PRE – REQUISITES:

   Computer Literacy.

   English Knowledge

UNIT I   FUNDAMENTALS OF PYTHON PROGRAMMING   6

Problem Solving Techniques - Algorithm – Flowchart – Pseudocode – logic design - Python Programming Language –Features - Python interpreter and interactive mode –Comments – indentations - Values and data types: Variables - expressions - statements – Operators - precedence of operators – Input and Output – Simple Programs.

UNIT II   CONTROL FLOW   5

Conditionals: Boolean values and operators - conditional (if) - alternative (if-else) – chained conditional (if-elif-else) - Iteration: state – while – for – break – continue – pass.

UNIT III   FUNCTIONS   5

Functions - Function argument and its types - return values – parameters - local and global scope - function composition – recursion.

UNIT IV   STRINGS, LISTS, TUPLES, DICTIONARIES AND SET   8

Strings: string slices – string functions and methods - string module - Lists: list operations - list slices - list methods - list loop – Lists as arrays - Tuples: tuple assignment - tuple as return value - Dictionaries: operations and methods – Set: Set & its operations.

UNIT V   FILES, MODULES, PACKAGES & GRAPHICS   6

Files and exception: text files - reading and writing files - format operator - command line arguments - errors and exceptions - handling exceptions – modules – packages – Graphics – Turtle graphics.

                                                                     TOTAL HOURS: 30

Lab Experiments:

Experiment 1: Simple Programs to implement Input / Output statements & Operators

Experiment 2: Programs to implement Selection statements

Experiment 3: Programs to implement Looping statements

Experiment 4: Programs to implement break, continue, pass statements

Experiment 5: Programs to implement Functions

Experiment 6: Programs to implement Strings

Experiment 7: Programs to implement string functions

Experiment 8: Programs to implement recursion

Experiment 9: Programs to implement List

Experiment 10: Programs to implement Tuples

Experiment 11: Programs to implement set, Dictionaries

Experiment 12: Programs to implement Files

Experiment 13: Programs to implement Modules

Experiment 14: Programs to implement Packages

Experiment 15: Programs to implement turtle graphics

TOTAL HOURS: 60

TEXT BOOKS(S):

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist"", 2nd edition, Updated for Python 3, Shroff/O"Reilly Publishers, 2016

REFERENCE(S):

1. John V Guttag, "Introduction to Computation and Programming Using Python"", Revised and expanded Edition, MIT Press , 2013

2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

3. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

4. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem- Solving Focus, Wiley India Edition, 2013.

WEB RESOURCE(S):

1. The Python Tutorial, https://docs.python.org/2.7/tutorial/

COURSE OUTCOME(S):

At the end of the course, the students will be able to:

CO106. 1   Develop simple Python programs.

CO106. 2   Structure simple Python programs for solving problems

CO106. 3   Decompose a Python program into functions.

CO106. 4   Represent compound data using Python lists, tuples, sets and dictionaries.

CO106. 5   Understand file management concepts, Exception Handling and develop
packages in Python Programs.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO106. 1	3	2	2		3	1						
CO106. 2	3	2	2		3	1						
CO106. 3	3	3	3	3		1						
CO106. 4	3	3	3	3		1						
CO106. 5	3		3									

1Low 2Medium 3High

19IT1311   PHYSICS AND CHEMISTRY LABORATORY   L T P C

0 0 4 2

PHYSICS LABORATORY

OBJECTIVES:

1. To introduce different experiments to test basic understanding of physics concepts applied in Conducting, Semiconducting, Ferromagnetic material, Thermal physics, Ultrasonic, Laser, Optics and Properties of matter.

2. To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

PRE-REQUISITE:

 Experiments in Physics and chemistry introduced at the higher secondary levels in schools.

LIST OF EXPERIMENTS FOR PHYSICS LABORATORY

(Any FIVE Experiments)

1. Determination of specific resistance of a given coil of wire – Carey Foster"s Bridge.
2. Determination of band gap of a Semiconductor.
3. Determination of hysteresis losses in ferromagnetic material-B-H curve.
4. Determination of thermal conductivity of a bad conductor – Lee"s Disc method.
5. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
6. Determination of Wavelength, and particle size using Laser
7. Determination of Numerical aperture and acceptance angle in an optical fiber.
8. Non-uniform pending- Determination of Young"s modulus of the material.
9. Determination of wavelength of spectral lines using grating – Spectrometer.
10. Determination of rigidity modulus – Torsion pendulum.

REFERENCE(S):

1. Physics Laboratory Manual, Department of Physics, Francis Xavier Engineering College, Tirunelveli.
2. Physics Laboratory Manual, Dr. G Senthilkumar VRB Publishers Pvt.Ltd.

LIST OF EXPERIMENTS FOR CHEMISTRY LABORATORY

(Any FIVE Experiments)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Estimation of copper content of the given solution by EDTA method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Estimation of iron content of the given solution using potentiometer.
6. Conductometric titration of strong acid vs strong base.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Conductometric precipitation titration ($BaCl_2$ vs Na_2SO_4).
9. Estimation of sodium and potassium present in water using flame photometer.
10. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

TEXTBOOK(S):

1. Vogel"s Textbook of Quantitative Chemical Analysis (8th edition, 2014)

TOTAL HOURS: 60

COURSE OUTCOMES:

CO107. 1   The students will gain knowledge on the basics of optics, thermal physics and ultrasonics.

CO107. 2   The students will have adequate knowledge in handling conducting, semiconducting and ferromagnetic materials.

CO107. 3   The students will apply the principles of elasticity for Engineering applications.

CO107. 4   The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

CO107. 5   The students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO107. 1	3	1							2		2	2
CO107. 2	3	1							2		2	2
CO107. 3	3	1							2		2	2
CO107. 4	3	1							2		2	2
CO107. 5	3	1							2		2	2

1Low 2Medium 3High

19IT1L01   VALUE EDUCATION   L T P C

2 0 0 -

COURSE OBJECTIVES:

1. Understand the need of values and its classification in contemporary society.
2. Appreciate the values needed for peaceful society like democratic, secular, and socialist etc.
3. Become aware of role of education in building value as dynamic social reality.
4. Know the importance of value education towards personal, national and global development.

PRE-REQUISITE:NIL

Unit-1: Education and Values

     Definition, Concept, Classification, Theory, Criteria and Sources of values

     Aims and objectives of value education

- Role and Need for value education in the contemporary society
- Role of education in transformation of values in society
- Role of parents, teachers, society, peer group and mass media in fostering values
- Teaching approaches and strategies to inculcate values through curricular and co-curricular activities

Unit 2: Value Education and Personal Development

- Human Values: Truthfulness, Constructivity, Sacrifice, Sincerity, Self-Control, Altruism,Scientific Vision, relevancy of human values to good life.
- Character Formation towards Positive Personality
- Modern challenges of adolescent: emotions and behavior
- Self-analysis and introspection: sensitization towards gender equality, physically challenged, intellectually challenged, Respect to - age, experience, maturity, family members, neighbors, co-workers.

Unit-3: Value Education towards National and Global Development

- Constitutional Values: Sovereign, Democracy, Socialism, Secularism, Equality, Justice,
- Liberty, Freedom, Fraternity
- Social Values: Pity and Probity, Self-Control, Universal Brotherhood.
- Professional Values: Knowledge Thirst, Sincerity in Profession, Regularity, Punctuality,Faith.
- Religious and Moral Values: Tolerance, Wisdom, character.
- Aesthetic Values: Love and Appreciation of literature, fine arts and respect for the same.

  Environmental Ethical Values
- National Integration and international understanding.
- Need of Humanistic value for espouse peace in the society
- Conflict of cross-cultural influences, cross-border education

TEXT BOOK(S):

1. Sharma, S.P. Moral and Value Education; Principles and Practices, Kanishka publishers, 2013.
2. Kiruba Charles & V. Arul Selvi. Value Education: Neelkamal Publications, New Delhi, 2012.

3. Chitakra, M.G.: Education and Human Values, A.P.H. Publishing Corporation, New Delhi. 2003.

REFERENCE(S):

1. Monica J. Taylor. Values in Education and Education in Value. Routledge. 1996.
2. Neil Postman. The End of Education: Redefining the Value of School. Vintage publisher. 1996.

WEB RESOURCES:

1. http://cbseportal.com/exam/e-books/download-free-ncert-e-book-education-for-values

COURSE OUTCOME(S):

CO108. 1Understand the role and need of value education

CO108. 2 know the human values for personal development

CO108. 3 understand the value education towards National and Global Development

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO108.1				3	3	3	3					3
CO108.2				3	3	3	3					3
CO108.3				3	3	3	3					3

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

II SEMESTER

SECOND SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19GE2101	Technical Communication	HSS	2	0	0	2	2
19MA2203	Transforms and Fourier Series	BS	3	1	0	4	4
19IT2511	Basic Electrical and Electronics Engineering	ES	3	0	0	3	3
19CS2504	C Programming	ES	3	0	0	3	3
19IT2511	Basic Electrical and Electronics Engineering Lab	ES	0	0	4	2	4
19IT2512	C Programming Laboratory	ES	0	0	4	2	4
19IT2513	Computer Hardware and Software Tools Laboratory	ES	0	0	4	2	4
19GE2M02	Fundamentals of Computational Biology	HSS	2	0	0	-	2
19IT2M02	Technical Presentation / Seminar	EEC	2	0	0	-	2
		TOTAL	**15**	**1**	**12**	**18**	**28**

19GE2101   TECHNICAL COMMUNICATION   L T P C
                                                2 0 0 2

OBJECTIVES:

1. Widen strategies and skills to augment their ability to read and comprehend engineering and technology texts.
2. Foster their capability to write convincing job applications and effective reports.
3. Develop their speaking skills to make technical presentations, participate in group discussions.
4. Strengthen their listening skill which will help them comprehend technical lectures and talks in their areas of specialization.
5. Cultivate writing skills both technical and general

PRE-REQUISITE:

   The pre-requisite knowledge required by the Students to study this Course is basic knowledge in English Language.

UNIT I   READING AND STUDY SKILLS   6

Listening - Listening to longer technical talks; Speaking – describing in detail the working process of any electronic/electrical machine; Reading – reading longer technical texts and taking down notes – Note Making strategies; Writing- interpreting charts, graphs; Vocabulary Development - Select Technical Vocabulary; Language Development- Active Voice and Passive Voice.

UNIT II   INTRODUCTION TO TECHNICAL WRITING   6

Listening- Listening to talks mostly of a scientific/technical nature and completing information; Speaking – Technical Presentations; Reading –Technical related topics; Writing- purpose statements – extended definitions - writing instructions – checklists - recommendations; Vocabulary Development- select technical vocabulary; Language Development – subject verb agreement, compound words.

UNIT III   INTERMEDIATE WRITING   6

Listening- Listening to mock Interviews; Speaking – answering Interview questions; Reading – longer texts both general and technical, practice in speed reading; Writing – Minutes of the Meeting – Writing opinion paragraph - Writing paragraphs with reasons; Language Development - If – Conditionals

UNIT IV   REPORT WRITING I   6

Listening- Listening to documentaries and making notes; Speaking –Making Technical Presentations; Reading – reading for detailed comprehension; Writing- Fire accident Report, Industrial Visit Report; Vocabulary Development- finding suitable synonyms-paraphrasing; Language Development- clauses.

UNIT V   REPORT WRITING II   6

Listening- Listening to Reports; Speaking –participating in a group discussion –Reading– reading and understanding technical articles; Writing– Writing Feasibility Reports, Survey Reports; Vocabulary Development- verbal analogies; Language Development- advanced use of articles, Prepositional phrases

TOTAL HOURS: 30

TEXT BOOKS(S):
1. Butterfield, Jeff. Soft Skills for Every one. Cengage Learning: New Delhi,2017.
2. Richards C. Jack and David Bohleke. Speak Now 4. Oxford Press 2014

REFERENCE(S):
1. Redston, Chris & Gillies Cunningham Face 2 Face (Pre-intermediate Student‟s Book & Workbook) Cambridge University Press, New Delhi:2005
2. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
3. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
4. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007
5. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014

WEB RESOURCES:
1. Learn Engineering
   https://www.youtube.com/user/LearnEngineeringTeam/videos?view=0&sort=p&shelf_id=14
2. Engineering Dictionary https://www.engineering-dictionary.com/
3. Interpretation of Charts https://www.youtube.com/watch?v=cTWXaLX2L6Y
4. IELS Listening Practice

5. https://play.google.com/store/apps/details?id=mimosa.english.ieltpractice.listening&
hl=en_IN

COURSE OUTCOMES:

CO201. 1   Read advanced technical texts and write area- specific texts effortlessly.

CO201. 2   Listen and comprehend extensive technical lectures and talks in their area of specialization successfully.

CO201. 3   Successfully answer questions during Interviews.

CO201. 4   Write good reports.

CO201. 5   Communicate effectively - adapting to purpose, structure, audience, and medium.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO201. 1				2			3		1	2	2	3
CO201. 2				2			2		3	3	2	2
CO201. 3				1			1		3	3	2	2
CO201. 4				3			2		2	2	3	2
CO201. 5				2			2		3	3	2	2

1Low 2Medium 3High

19MA2203   TRANSFORMS AND FOURIER SERIES   L T P C
                                         3 1 0 4

OBJECTIVES:

1. To improve the knowledge of Laplace transform.

2. To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems

3. To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.

4. To acquaint the student with Fourier transform techniques used in wide variety of situations.

5. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

PRE-REQUISITE:

 To study this course should have basic knowledge about Vectors, continuous function and complex fields.

UNIT I   LAPLACE TRANSFORMS   9+3

Transforms of simple functions – Basic operational properties – Inverse transforms – Convolution theorem – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.

UNIT II   FOURIER SERIES   9+3

Dirichlet''s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval''s identity – Harmonic analysis.

UNIT III   APPLICATIONS OF FOURIER SERIES   9+3

Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV   FOURIER TRANSFORMS   9+3

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval''s identity.

UNIT V   Z – TRANSFORMS AND DIFFERENCE EQUATIONS   9+3

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL HOURS : 45 + 15

REFERENCE(S):

1. K Venugpopal Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.

2. Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

3. B.V Ramana.., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016

4. Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.

5. G. James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

COURSE OUTCOMES:

CO202. 1   Make them to analyse Laplace transforms and inverse Laplace transforms of simple functions.

CO202. 2   Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

CO202. 3   Appreciate significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations

CO203. 4   Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

CO204. 5   Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO202. 1	1		2						3			2
CO202. 2	1	2	1									3
CO202. 3	2								1			
CO203. 4		1	2									2
CO204. 5	2								2			

1Low 2Medium 3High

19IT2511 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L T P C
3 0 0 3

OBJECTIVES:

1. To explain the basic theorems used in Electrical circuits and the different components
2. T explain the function of Electrical Machines
3. To explain the fundamentals of semiconductor and applications
4. To explain the principles of Digital Electronics
5. To impart knowledge of communication Engineering.

PRE-REQUISITE:

- Engineering Physics

UNIT I   ELECTRICAL CIRCUITS & MEASURMENTS   9

Ohms Law – Kirchoff"s Laws – Steady state solution of DC circuits- Introduction to AC Circuits –Operating Principles of Moving Coil, Moving Iron Instruments, Dynamometer type Wattmeter and Induction type energy meter.

UNIT II   ELECTRICAL MACHINES   9

DC Generator-DC Motor-Single Phase Transformer- single phase induction Motor: Construction, Principle of Operation, EMF Equation and Applications.

UNIT III   SEMICONDUCTOR DEVICES AND APPLICATIONS   9

Characteristics of PN Junction Diode and Zener Diode– Half wave and Full wave Rectifier – Bipolar Junction Transistor: CB, CE, CC Configurations and Characteristics.

UNIT IV   DIGITAL ELECTRONICS   9

Binary Number System – Logic Gates – Half and Full Adders – Flip-Flops: RS, D, T and JK – Registers and Counters.

UNIT V   FUNDAMENTALS OF COMMUNICATION ENGINEERING   9

Types of Signals: Analog and Digital Signals – Modulation: Amplitude and Frequency Modulation-Demodulation-Communication Systems: Radio, TV, Microwave, Satellite and Mobile communication. (Block Diagram Approach only)

TOTAL HOURS : 45

TEXT BOOKS

1. R.Muthusubramanian, S.Salivahanan and K A Muraleedharan, "Basic Electrical, Electronics and Computer Engineering", 2nd ed., Tata McGraw Hill, 2012.

2. D P Kothari and I.J Nagarath, "Electrical Machines "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint ,2016.
3. S.K.Bhattacharya "Basic Electrical and Electronics Engineering", Pearson India, 2011
4. Sedha R.S., "Applied Electronics", S. Chand & Co., 2006

REFERENCE(S):

1. Mittle and V. N. Mittle, "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 2005.

2. T K Nagsarkar and M S Sukhija, "Basics of Electrical Engineering", Oxford press 2005.

3. Leonard S Bobrow, " Foundations of Electrical Engineering", Oxford University Press, 2013

4. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, 1994.

Web Resource(s):

 https://nptel.ac.in/courses/108108076/

 https://nptel.ac.in/courses/117103063/- First Module

COURSE OUTCOME (S):

CO203. 1 Ability to understand the fundamental laws and to measure the Electrical Quantities

CO203. 2 Ability to understand the function of AC and DC machines.

CO203. 3 Ability to understand the semiconductor and their applications.

CO203. 4 Ability to understand the Digital Electronics.

CO203. 5 Ability to understand the Communication systems.

PO Vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO203. 1	3	3	3	3								2
CO203. 2	3	3	3	3								2
CO203. 3	3	2	2									2
CO203. 4	3	2	1	2								2
CO203. 5	3	1										2

1Low 2Medium 3High

19CS2504   C PROGRAMMING   **L T P C**

                                                          3 0 0 3

OBJECTIVES:

1. To learn the basic constructs of C Programming.
2. To learn arrays and strings concepts of C Programming.
3. To learn functions and pointers in C and use pointers for storing data in the main memory efficiently.
4. To learn structures and union concepts of C Programming
5. To learn file processing functions.

PRE-REQUISITE: 19IT1502 - Problem Solving & Python Programming

UNIT I   BASICS OF C PROGRAMMING   9

Structure of a „C‟ program, compilation and linking processes - C Tokens: Constants, Variables – Data Types: Primitive Data Types, Type Definition, Enumeration, Qualifiers, Storage classes – Operators and Expressions - Managing Input and Output operations – Decision Making: Branching statements, Looping statements-Problem Solving with Basic statements.

UNITII   ARRAYS AND STRINGS   9

Arrays: Declaration, Initialization, One dimensional, Two dimensional, and Multidimensional arrays - String: String operations – Manipulating String Arrays –Problem Solving with Arrays and Strings

UNIT III   FUNCTIONS AND POINTERS   9

Function : Declaration, Definition, Parameter passing methods, Recursion – Pointers: Declaration, Definition, Pointers and Functions, Pointer arithmetic, Pointer to an Array, Array of Pointers, Pointer to Pointer, Pointer to void (generic pointer), Pointer to function - Dynamic Memory Allocation - Problem Solving with Functions and Pointers

UNIT IV   STRUCTURE AND UNION   9

Structure and Union - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Self referential structures – Dynamic memory allocation - Singly linked list - typedef

UNIT V   FILE PROCESSING   9

Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments

TOTAL HOURS: 45

TEXT BOOKS(S):

1. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009

2. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007. Kernighan,B.Wand Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2006

3. E. Balagurusamy, "Computing Fundamentals and C Programming ",Mcgraw Hill, Edition: 2, 2017

REFERENCE(S):

1. Byron S Gottfried, "Programming with C", Schaum"s Outlines, Second Edition, Tata McGraw-Hill, 2006.

2. R.G. Dromey, "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007

3. Deitel.P.J and Deitel.H.M, "C How to Program", Fifth Edition, Prentice-Hall of India,2008

4. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

WEB RESOURCE(S):

1. http://cslibrary.stanford.edu

2. http://c-faq.com, www.nptel.ac.in

COURSE OUTCOME(S):

Upon completion of the course, the students will be able to: CO204. 1

Develop simple applications in C using basic constructs CO204. 2

Develop and implement applications using arrays and strings.

CO204. 3   Develop and implement applications in C using functions and pointers and use pointers for storing data in the main memory efficiently.

CO204. 4   Develop applications in C using structures and union.

CO204. 5   Design applications using sequential and random access file processing.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO204. 1	3	1	3									
CO204. 2	3	1	3									
CO204. 3	3	1	3	2								
CO204. 4	3	1	3	2								
CO204. 5	3	1	3	2		3						3

1Low 2Medium 3High

19IT2511   BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

L T P C

0 0 4 2

OBJECTIVE:

To train the students with hands on experience on various basic engineering practices in Electrical and Electronics Engineering

PRE-REQUISITE: Secondary Physics

1. ELECTRICAL ENGINEERING PRACTICE   30

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring
3. Stair case wiring
4. Verify Kirchoffs laws – KCL – KVL
5. Measurement of energy using single phase energy meter.
6. Load test on DC shunt motor.
7. Load test on Single phase Transformer

2. ELECTRONICS ENGINEERING PRACTICE   30

1. Study of Electronic components and equipments – Resistor, color coding, series and parallel connections.
2. Verification of logic gates AND, OR, EX-OR NOT .
3. Study of CRO and measurement of AC signal parameter (peak-peak, RMS period, frequency) using CRO.
4. Characteristics of PN junction diode.

5. Soldering practice – Components Devices and Circuits – Using general purpose PCB

6. Measurement of ripple factor of HWR and FWR.

TOTAL HOURS :60

COURSE OUTCOMES:

CO205. 1   Able to design different electrical wiring.

CO205. 2   Ability to verify basic circuits theorems and measurement of energy using energy meter.

CO205. 3   Ability to determine the characteristics of electrical machines.

CO205. 4   Ability to Understand the basic Electronic components and measuring methods

CO205.5   Able to design circuit for clock signal generation and analysis ripple factor in rectifiers

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO205. 1	3	3	3	3								
CO205. 2	3	3	3									3
CO205. 3	3	3	3	3								
CO205. 4	3	3	3	3								3
CO205.5	3	33	3	3								

1Low 2Medium 3High

19IT2512   **C PROGRAMMING LABORATORY**   **L T P C**

0 0 4 2

OBJECTIVES:

1. To develop C programs using conditional and looping statements
2. To expertise in arrays and strings
3. To build modular programs
4. To explicitly manage memory using pointers
5. To group different kinds of information related to a single entity

PREREQUISITE:

 19IT1502 - Problem Solving & Python Programming

LIST OF EXPERIMENTS

1. Programs using simple statements
2. Programs using decision making statements
3. Programs using looping statements
4. Programs using one dimensional and two dimensional arrays
5. Programs using user defined functions and recursive functions
6. Programs using functions and pointers
7. Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
8. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
9. Check whether a given number is Armstrong number or not?
10. From a given paragraph perform the following using built-in functions:
    a. Find the total number of words.
    b. Capitalize the first word of each sentence.
    c. Replace a given word with another word.
11. Sort the list of numbers using pass by reference.
12. Generate salary slip of employees using structures and pointers.
13. Compute internal marks of students for five different subjects using structures and unions.

TOTAL HOURS: 60

REFERENCE(S):

1. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009
2. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006
3. Byron S Gottfried, "Programming with C", Schaum"s Outlines, Second Edition, Tata McGraw-Hill, 2006.
4. Deitel.P.J and Deitel.H.M, "C How to Program", Fifth Edition, Prentice-Hall of India,2008
5. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

WEB RESOURCE(S):

1. http://cslibrary.stanford.edu
2. http://c-faq.com,www.nptel.ac.in

COURSE OUTCOMES:

CO206. 1   Implement program using control statements

CO206. 2   Handle arrays and strings

CO206. 3   Develop reusable modules

CO206. 4   Store data in main memory effectively using pointers

CO206. 5   Form heterogeneous data using structures

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO206. 1	3	1	3									
CO206. 2	3	1	3									
CO206. 3	3	1	3	2								
CO206. 4	3	1	3	2								
CO206.5	3	1	3	2								

1Low 2Medium 3High

19IT2513   COMPUTER HARDWARE AND SOFTWARE LABORATORY

L T P C

0 0 4 2

OBJECTIVES:

1. Understand the basic hardware components
2. Gain knowledge about installation of operating systems
3. Understand hardware assembling and troubleshooting
4. Learn about MS Office tools.
5. Understand computer networking

Laboratory Experiments

EXPERIMENT 1

a) Study of desktop computer, motherboard and its interfacing components.
b) Install and configure computer drivers and system components.

EXPERIMENT 2

    a) Disk formatting, partitioning and Disk operating system commands

EXPERIMENT 3

    a) Install, upgrade and configure Windows/Linux operating systems.

    b) Installation of Dual OS using Virtual Machine

EXPERIMENT 4

    a) Installation Antivirus and configure the antivirus.

    b) Installation of printer and scanner software.

EXPERIMENT 5

    a) Assembly and Disassembly of hardware.

    b) Troubleshooting and Managing Systems

EXPERIMENT 6

    a) Recovering the root file system after corruption.

    b) Create a FAT32 formatted partition on a disk in Windows 7, and convert the partition to NTFS

EXPERIMENT 7

    a) Remote desktop connections and file sharing.

EXPERIMENT 8

    a) Study of basic network commands. Establish network connections, Configure IP address and Domain name system.

EXPERIMENT 9

    a) Install two different kinds of network cards and connect two computers to campus LAN and download a file from a computer on the LAN

EXPERIMENT 10

    a) Create an advertisement page in Word

    b) Create a Mail Merge Letter and a macro for inserting a picture and formatting the text in Word

EXPERIMENT 11

    a) Create a report in Excel containing the pay details of the Employee

EXPERIMENT 12

    a) Create a simple bar chart to high light the sales of a company for 5 different periods

EXPERIMENT 13

a) Create a macro which creates a line chart using the data in the worksheet

EXPERIMENT 14

a) Make a presentation and apply the following:

  ⬜ Add audio and video effects, Apply various Color Schemes, Apply various animation schemes.

EXPERIMENT 15

a) Create a simple Database / Tables using MS-Access

b) Mail Merge with MS – Access

COURSE OUTCOMES:

CO207. 1　　Identify the basic hardware components

CO207. 2　　Install and configure Windows and Linux operating systems

CO207. 3　　Install and configure software packages and drivers

CO207. 4　　Assemble and troubleshoot hardware devices

CO207. 5　　Install and work with office automation software

PO vs CO MAPPING:

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO207. 1	3		3		3							
CO207. 2	3		3		3							3
CO207. 3	3		3		3							3
CO207. 4	3	2	3		3							3
CO207. 5	3		3		3							3

1Low 2Medium 3High

19GE2M02　　FUNDAMENTALS OF COMPUTATIONAL BIOLOGY　　L　T　P C

2　0　0 -

OBJECTIVES:

The course will enable students to:

  ⬜ To introduce students to modern biology with an emphasis on evolution of biology as a multi-disciplinary field.

  ⬜ To make them aware of application of engineering principles in biology, and engineering solutions inspired by biological examples.

- ⬛ Know the principle of biosensor, classifications and the characteristics of different sensors and study its biomedical applications.

- ⬛ Understand the applications biology for computational applications in IT

PREREQUISITE:

- ⬛ Secondary School Science Knowledge

UNIT I   PHYSIOLOGY OF CELLS   6

Introduction to Biology – The Cell: Structure – Expression of genetic information – Cell Metabolism – Cellular differentiation – What is Computational Biology?

UNIT II   MOLECULAR BIOLOGY   6

Introduction to Molecules - chemical bonds – DNA – Structure – RNA – Protein Synthesis – Transcription – Translation – Stem cells – applications – DNA Computing.

UNIT III   NERVOUS SYSTEM, IMMUNE SYSTEM & CELL SIGNALLING   8

Basics of nervous system and neural networks – cellular basis of immunity – functional properties of antibodies – T cell receptors – principles of cell signalling - Neuro morphic computing - Brain Computer Interface.

UNIT IV   BIO SENSORS   5

Biosensors – Fundamentals – Components - Types – Designs – Applications.

UNIT V   APPLICATIONS OF COMPUTATIONAL BIOLOGY   5

Bio Computers - Bio Informatics - Synthetic biology – Molecular programming – Tele Medicine – Computational biology towards Data Science.

TOTAL HOURS : 30

TEXT BOOKS(S):

1. ThyagaRajan.S., Selvamurugan. N., Rajesh.M.P., Nazeer.R.A., Richard W. Thilagaraj, Barathi.S., and Jaganthan.M.K., "Biology for Engineers", Tata McGraw-Hill, New Delhi, 2012.

REFERENCE(S):

1. Jeremy M. Berg, John L. Tymoczko and Lubert Stryer, "Biochemistry", W.H. Freeman and Co. Ltd., 6th Ed., 2006.

2. Robert Weaver, "Molecular Biology", MCGraw-Hill, 5th Edition, 2012. 4. Jon Cooper, "Biosensors A Practical Approach", Bellwether Books, 2004.

3. Martin Alexander, "Biodegradation and Bioremediation", Academic Press, 1994.

4. Kenneth Murphy, "Janeway's Immunobiology", Garland Science; 8th edition, 2011.

5. Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, "Principles of Neural Science", McGraw-Hill, 5th Edition, 2012.

WEB RESOURCE(S):

1. http://nanohub.org/resources/2261/download

COURSE OUTCOMES:

CO208. 1   Appreciate the basic organization of organisms and machinery of the cell.

CO208. 2   Explain concepts such as DNA structure and potential of molecular biology associated with the new technologies.

CO208. 3   Acquire knowledge about biological system that requires engineering expertise to solve them.

CO208. 4   Describe and critically evaluate a selected application of a biosensor

CO208. 5   Appreciate the engineering principles in biology, and engineering solutions for biological systems.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO208. 1												3
CO208. 2				3	3	2						3
CO208. 3				2	2							3
CO208. 4				3	3							3
CO208. 5	3	2	3	2	2							3

1Low 2Medium 3High

19IT2M02 TECHNICAL PRESENTATION / SEMINAR **L T P C**

2   0   0 -

Course Objective:

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

III SEMESTER

THIRD SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19IT3201	Probability & Statistics	BS	3	1	0	4	4
19IT3501	Digital Principles and System Design	ES	3	1	0	4	4
19IT3601	Computer Organisation and Architecture	PC	3	0	0	3	3
19IT3602	Data Structures & Algorithms	PC	3	0	0	3	3
19IT3603	Information Theory and Coding	PC	3	0	0	3	3
19IT3604	Object Oriented Programming	PC	2	0	2	3	3
19IT3511	Digital Laboratory	ES	0	0	4	2	4
19IT3612	Data Structures & Algorithms Laboratory	PC	0	0	4	2	4
19GE3M01	Communication and Soft Skills	HSS	0	0	2	-	2
19IT3AP1	Aptitude – I		1	0	0	-	1
		TOTAL	**18**	**2**	**12**	**24**	**31**

19IT3201   PROBABILITY & STATISTICS   **L T P C**

                                                                               3 1 0 4

OBJECTIVES:

The course will enable students to:

1. This course aims at providing the required skill to apply the statistical tools in engineering problems.
2. To introduce the basic concepts of random variables
3. To introduce the basic concepts of two dimensional random variables
4. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
5. To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

PREREQUISITE:

 To study this course the students should have the basic knowledge about measures of central containices and probability.

UNIT I   RANDOM VARIABLES   9+3

Random variables-Discrete and continuous random variables-Moments-Moment generating functions- Binomial, Poisson, Uniform, Exponential and Normal distributions.

UNIT II   TWO DIMENSIONAL RANDOM VARIABLES   9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression

UNIT III   TESTING OF HYPOTHESIS   9+3

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Goodness of fit.

UNIT IV   DESIGN OF EXPERIMENTS   9+3

One way and Two wayclassifications - Completely randomized design – Randomized blockdesign - Latin square design

UNIT V   STATISTICAL QUALITY CONTROL   9+3

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

                                                          TOTAL HOURS : 45+15

TEXT BOOKS(S):

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund„s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.

REFERENCE(S):

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences‖, Cengage Learning, New Delhi, 8th Edition, 2014.
2. Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.
4. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum„s Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004
5. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th Edition, 2007.

COURSE OUTCOMES:

CO301. 1 Make them to understand the fundamental knowledge of the concepts of random variables and standard distributions which can describe real life phenomenon.

CO301. 2 Make them to understand the basic concepts of two dimensional random variables and apply in engineering applications.

CO301. 3 Make them to apply the concepts of testing of hypothesis for small and large samples in real life problems.

CO301. 4 Make them to apply basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.

CO301. 5 Make them to have the notion of sampling distributions and statistical techniques used in engineering and management problems.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO301. 1	1		2						3			

CO301. 2	2	1						1			3
CO301. 3		2	1								2
CO301. 4	1		2								2
CO301. 5		2						2			

1Low 2Medium 3High

19IT3501   DIGITAL PRINCIPLES AND SYSTEM DESIGN   L T P C

3 1 0 4

OBJECTIVES:

1. To design digital circuits using simplified Boolean functions
2. To analyze and design combinational circuits
3. To analyze and design synchronous and asynchronous sequential circuits
4. To understand Programmable Logic Devices
5. To write HDL code for combinational and sequential circuits

PREREQUISITE:

 Higher Secondary physics

UNIT I   BOOLEAN ALGEBRA AND LOGIC GATES   9+3
Number Systems - Arithmetic Operations - Binary Codes- Boolean Algebra and Logic Gates - Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Simplification of Boolean Functions using Karnaugh Map - Logic Gates – NAND and NOR Implementations.

UNIT II   COMBINATIONAL LOGIC   9+3
Adders and Subtractors - Carry Look Ahead Adder - BCD Adder - Code Converters - Magnitude Comparator - Decoders – Encoders – Multiplexers - Parity generators and Checkers - Introduction to   HDL   –   HDL   Models   of   Combinational   circuits.

UNIT III   SYNCHRONOUS SEQUENTIAL LOGIC   9+3
Sequential Circuits - Storage Elements: Latches , Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters : Design of   Ripple   counter.   Mod-n   Counter,   Johnson   counter,   Ring   counter.

UNIT IV   ASYNCHRONOUS SEQUENTIAL LOGIC   9+3
Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.

UNIT V   MEMORY AND PROGRAMMABLE LOGIC   9+3

RAM – Memory Decoding – Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.

TOTAL HOURS: 60

TEXT BOOKS(S):

1. M. Morris R. Mano, Michael D. Ciletti, ―Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog‖, 6th Edition, Pearson Education, 2017.

REFERENCE(S):

1. G. K. Kharate, Digital Electronics, Oxford University Press, 2010
2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013
4. Donald D. Givone, Digital Principles and Design‖, Tata Mc Graw Hill, 2003

COURSE OUTCOMES:

CO302. 1	Understand the basic concepts of Number systems, Binary arithmetic, Binary codes, Boolean Laws and Solve Boolean expressions using K-Map. Boolean functions using Kaurnaugh Map.
CO302. 2	Solve Combinational circuits and Analyze them using HDL language.
CO302. 3	Solve and AnalyzeSynchronous Sequential Circuits.
CO302. 4	Solve and Analyze Asynchronous Sequential Circuits.
CO302. 5	Understand the concept of Error Detection, Error Correction and Programmable Logic Devices and solve expressions using the PLD devices.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO1	3	3										
CO2	3	3	3	3	3							
CO3	3	3	3	3	3							
CO4	3	3	3	3	3							
CO5	3	3	3	3								

1→Low 2→Medium 3→High

19IT3601   COMPUTER ORGANISATION AND ARCHITECTURE   L T P C
3 0 0 3

OBJECTIVES:

1. To learn the basic structure and operations of a computer.
2. To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
3. To learn the basics of pipelined execution.
4. To understand parallelism and multi-core processors.
5. To understand the memory hierarchies, cache memories and virtual memories.
6. To learn the different ways of communication with I/O devices.

PREREQUISITE:

   19IT2513 – Computer Hardware and Software Tools Laboratory

UNIT I   BASIC STRUCTURE OF COMPUTER   8

Functional units and its operational concepts - Performance - Memory operations, locations and addresses - Instruction and instruction sequencing - Addressing modes - Assembly language.

UNIT II   ARITHMETIC OPERATIONS IN COMPUTERS   10

Fixed Point Arithmetic - Addition and subtraction of signed numbers - Design of fast adders - Multiplication of positive numbers - Signed operand multiplication and fast multiplication- Integer division - Floating point numbers and operations.

UNIT III   CONTROL UNIT AND PROCESSING   10

A Basic MIPS implementation – Building a Data path – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV   PARALLELISM   9

Parallel processing and its challenges-Instruction level parallelism -Flynn's classification - Hardware multithreading: SISD, MIMD, SIMD, SPMD and Vector multithreading- Multi-core processors: Shared memory multiprocessor and cluster multiprocessor.

UNIT V   MEMORY MANAGEMENT AND I/O SYSTEMS   8

Memory Hierarchy - memory technologies – cache memory – measuring and improving cache   performance – virtual memory, TLB„s – Accessing I/O Devices- Interrupts-

Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.

TOTAL HOURS : 45

TEXT BOOKS(S):

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCE(S):

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.

2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.

3. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach‖, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

WEB REFERENCES:

http://nptel.ac.in/

COURSE OUTCOMES:

CO303. 1   Understand the basics structure of computers, operations and instructions.

CO303. 2   Design arithmetic and logic unit.

CO303. 3   Understand pipelined execution and design control unit.

CO303. 4   Understand parallel processing architectures.

CO303. 5   Understand the various memory systems and I/O communication.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO303. 1	3	1	3									
CO303. 2	3	1	3	3								
CO303. 3			3	3								3
CO303. 4	3	3	3									3
CO303. 5				3	3							3

1Low 2Medium 3High

19IT3602   DATA STRUCTURES & ALGORITHMS   **L T P C**
                                                        3 0 0 3

OBJECTIVES:

The course will enable students to:

1. To master the design and applications of linear, tree, and graph structures.
2. To understand various algorithm design and analysis techniques.

PREREQUISITE:

 19IT2512 - C Programming Lab, 19IT2502 - C Programming

 19IT1502 - Problem Solving & Python Programming

UNIT I   LINEAR STRUCTURES   9

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – Singly Linked List – doubly-linked lists – applications of lists – Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues

UNIT II   TREE STRUCTURES   9

Tree ADT – tree traversals – left child right sibling data structures for general trees – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT – AVL trees – binary heaps.

UNIT III   GRAPHS   9

Definitions – Topological sort – breadth-first traversal - shortest-path algorithms – minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal – biconnectivity – Euler circuits.

UNIT IV   INTRODUCTION TO ALGORITHM ANALYSIS   9

Notion of an Algorithm – Fundamentals of the Analysis of Algorithmic Efficiency – Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms – Visualization

UNIT V   ALGORITHM DESIGN TECHNIQUES   9

Introduction to algorithm design techniques: Greedy algorithms - Huffman Trees, Divide and conquer: Binary Search, Quick Sort, Merge Sort – Dynamic programming: Floyd & Warshall‟s Algorithm, Backtracking: N-Queens Problem, branch and bound: Job Assignment Problem – Introduction to NP-complete problems

TOTAL HOURS : 45

TEXT BOOKS(S):

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 1997.

2. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

REFERENCE(S):

1. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms",Pearson Education, 1983.

2. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2005.

3. A. M. Tenenbaum, Y. Langsam, and M. J. Augenstein, "Data Structures using C",Pearson Education, 1998.

4. Sara Baase and A. Van Gelder, "Computer Algorithms", Third Edition, Pearson Education, 2000.

5. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Second Edition, Prentice Hall of India Ltd

WEB REFERENCES:

http://nptel.ac.in/

COURSE OUTCOMES:

CO304. 1   Implement abstract data types for linear data structures and apply them to problem solutions.

CO304. 2   Implement abstract data types for non linear data structures – trees apply them to problem solutions.

CO304. 3   Implement abstract data types for non linear data structures – graphs apply them to problem solutions.

CO304. 4   Design algorithms for various computing problems and analyze the time and space complexity of algorithms.

CO304. 5   Ability to understand and design algorithms using various algorithm design techniques for the given problem

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO304. 1	3	3	3									
CO304. 2		3	3	3								
CO304. 3	3	3	3	3								
CO304. 4	3	3										
CO304. 5	3	3							2			3

1Low 2Medium 3High

19IT3603   INFORMATION THEORY AND CODING   L T P C

3 0 0 3

OBJECTIVES:

1. To acquire knowledge on information and entropy
2. Gain knowledge about error control codes design of an encoder and decoder.
3. Understand convolution coding
4. Learn about text compression, speech and audio coding.

PREREQUISITE:

 Basic Electronics Engineering

UNIT I   INFORMATION THEORY   9

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT II   ERROR CONTROL CODING: BLOCK CODES   9

Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder - CRC

UNIT III   ERROR CONTROL CODING: CONVOLUTIONAL CODES   9

Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

UNIT IV   SOURCE CODING: TEXT, AUDIO AND SPEECH   9

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 - Speech: Channel Vocoder, Linear Predictive Coding.

UNIT V   SOURCE CODING: IMAGE AND VIDEO   9

Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261,   MPEG   standard.

TOTAL HOURS: 45

TEXT BOOKS(S):

1. R Bose, "Information Theory, Coding and Cryptography", TMH 2007
2. Fred Halsall, "Multidedia Communications: Applications, Networks, Protocols and Standards", Pearson Education Asia, 2002

REFERENCE(S):

1. K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006
2. S Gravano, "Introduction to Error Control Codes", Oxford University Press 2007
3. Amitabha Bhattacharya, "Digital Communication", TMH 2006
4. Communication Systems,3/e, by A.B. Carlson, Mc. Graw Hill Publishers.
5. Digital Communications by Simon Haykin , John Wiley & Sons.

6. **COURSE OUTCOME(S):**

CO305. 1   Understand the fundamentals of coding theory

CO305. 2   Understand concept of source coding and channel coding theorem.

CO305. 3   Understand and Analyze various error control codes

CO305. 4   Analyze the principles of text compression, speech and audio coding.

CO305. 5   Understand image and video coding.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO305. 1	3	2	3									
CO305. 2	3	2	3									
CO305. 3	3	2	3									3

| CO305. 4 | 3 | 2 | 2 | | | | | | | | | 3 |
| CO305. 5 | 3 | 2 | 3 | | | | | | | | | 3 |

1Low 2Medium 3High

19IT3604   OBJECT ORIENTED PROGRAMMING   **L T P C**

                                                      2 0 2 3

OBJECTIVES:

The course will enable students to:

1. To understand the Object Oriented Programming features and Fundamentals of Java.
2. To implement packages in Java and implement inheritance.
3. To understand the concept of Exception handling and Interfaces in Java.
4. To implement the concept of Files and Interfaces in Java.
5. To develop a GUI application in Java and connect a Database using Java.

PREREQUISITE:

- 19IT2502 - C Programming
- 19IT2512 - C Programming Lab

UNIT I   OOP CONCEPTS &   BASICS OF JAVA   6

Object Oriented Programming Fundamentals – Object – class- Inheritance- Polymorphism- Dynamic binding - The Genesis of Java - Overview of Java - Data Types, Variables, and Arrays - Operators - Control Statements - Introducing Classes - Methods and Classes. I/O Basics - Reading Console Input -Writing Console output.

UNIT II   INHERITANCE AND PACKAGES   6

Inheritance: Basics - Using Super - Creating a Multilevel Hierarchy - Method overriding - Using Abstract Classes - Packages and Interfaces: Packages - Access Protection - Importing Packages

UNIT III   INTERFACES, EXCEPTIONS AND THREAD   6

Interfaces Definitions and Implementations - Exception Handling: Types - Try and Catch - Throw - Multi-threaded Programming: Creating Threads - Inter Thread Communication.

UNIT IV   STRING HANDLING AND FILES   6

File - The Byte Streams - The Character Streams - Using Stream I/ O - Serialization. String Handling: Special String operations and Methods - String Buffer - Exploring java.lang:

Simple type Wrappers - System - Math - Utility Classes: String Tokenizer - Date and Time - Collection Interfaces -Collection Classes

UNIT V   APPLETS, EVENT HANDLING AND AWT   6

Applet Basics - Applet Architecture - Applet Display Methods - Event Handling Mechanisms - Event Classes - Event Listener - Working with Windows , Graphics , Colors and Fonts - AWT Controls - Layout Managers and Menus - JDBC Concepts.

TOTAL HOURS: 30

Lab Experiments   30

- Program on Classes and MethodS
- Implementation of Inheritance
- Implementation of Interfaces and Packages
- Implementation of Multithreaded Programming
- Develop a program to implement String Handling Methods
- Implementation of Exception handling mechanisms
- Implementation of Collections Interfaces and Classes
- Implementation of I/O Streams
- Implementation of Applet Programs
- Implementation of AWT controls
- Implementation of Event classes
- JDBC connectivity
- Mini Project.

TOTAL HOURS : 60

REFERENCE(S):

1. Herbert Schildt, Java 2-Complete Reference, Tata Mc Graw Hill, 2015
2. Deitel & Deitel, Java How to Program, Prentice Hall of India, 2010
3. Gary Cornell and Cay S.Horstmann, Core Java Vol.1 and Vol.2, Sun Microsystems Press, 2008
4. Jeff Linwood and Dave Minter, Beginning Hibernate Second Edition, Apress 2010
5. Rod Johnson, Juergen Hoeller, Alef Arendsen, Thomas Risberg, Colin Sampaleanu, Java Development with the Spring Framework, Wiley-India, 2012

WEB REFERENCES:

1. www.tutorialspoint.com

2. www.w3schools.com

3. www.nptel.ac.in

COURSE OUTCOMES:

CO306. 1   Interpret the basic structure of Java program by getting user data.

CO306. 2   Implement various types of inheritance and packages under different accessibility

CO306. 3   Describe the concept of interfaces, exceptions and multithreading nature of Java.

CO306. 4   Develop applications in Java with files and Strings handling

CO306. 5   Design desktop-based Java applications using Java Applet, AWT and its components

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO306. 1	3	3										
CO306. 2	3	3	3	3								
CO306. 3	3	3	3	3								
CO306. 4	3	3	3									
CO306. 5	3	3	3	3	3							

1Low 2Medium 3High

19IT3511   DIGITAL LABORATORY   **L T P C**

                                                                  0 0 4 2

OBJECTIVES:

1. To understand the various basic logic gates

2. To design and implement the various combinational circuits

3. To design and implement combinational circuits using MSI devices.

4. To design and implement sequential circuits

5. To understand and code with HDL programming

PREREQUISITE:

  Higher Secondary physics

List of Experiments:

1. Verification of Boolean Theorems using basic gates

2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters

3. Design and implement Half/Full Adder and Subtractor.

4. Design and implement combinational circuits using MSI devices:
   - 4 – bit binary adder / subtractor , Parity generator / checker, Magnitude Comparator
   - Application using multiplexers

5. Design and implement shift-registers.

6. Design and implement synchronous counters.

7. Design and implement asynchronous counters.

8. Coding combinational circuits using HDL.

9. Coding sequential circuits using HDL.

10. Design and implementation of a simple digital system(Mini Project)

TOTAL HOURS: 45

List of equipment for a batch of 30 students:

Laboratory requirement for batch of 30 students hardware:

- Digital trainer kits - 30
- Digital ICs required for the experiments in sufficient numbers

Software: HDL simulator

OUTCOMES:

CO307. 1   Implement simplified combinational circuits using basic logic gates

CO307. 2   Implement combinational circuits using MSI devices

CO307. 3   Implement sequential circuits like registers and counters

CO307. 4   Simulate combinational and sequential circuits using HDL

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO307. 1	3	2	3									
CO307. 2	3	2	3									
CO307. 3	3	2	3									
CO307. 4	3	2	3	3	3							

1Low 2Medium 3High

19IT3612   DATA STRUCTURES & ALGORITHMS LABORATORY

L T P C
0 0 4 2

OBJECTIVES:

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph traversal algorithms
- To get familiarized to sorting and searching algorithms

PREREQUISITE:

- 19IT2502 - C Programming, 19IT2512 - C Programming Lab

List of Experiments:

- Design a list and perform insertion, deletion and searching using Array. Design a Singly linked list and perform insertion, deletion and searching using Linked list.
- Construct a stack ADT and perform push and pop operations using Array and Linked List.
- Construct a Queue ADT and perform enqueue and dequeue operations using Array and Linked list.
- Develop a program to perform infix to postfix conversion using stack ADT.
- Develop a program to evaluate an expression using stack ADT.
- Develop a program to create a Binary Search Tree and to traverse the tree.
- Develop a program to create an AVL Tree.
- Compute the shortest path from a single source node using Dijikstra"s Algorithm.
- Construct a graph and perform graph traversal (BFS, DFS)
- Develop a program to construct a minimum spanning tree with the given graph using: Prim"s Algorithm and Krushkal"s Algorithm
- Implementation of searching algorithms: Linear Search and Binary Search.
- Implementation of sorting algorithms: Insertion sort, Selection sort, Shell sort, Bubble sort.

TOTAL HOURS : 45

COURSE OUTCOMES:

CO308. 1   Compute the time and space complexity of searching and sorting algorithms with asymptotic notations.

CO308. 2   Implement all the operations of linear data structures to store and retrieve the given data.

CO308. 3   Create a hierarchical data structure to represent the given data using tree data structure.

CO308. 4   Design graph algorithms to compute the shortest path of the given graph and to identify the minimum spanning tree.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO308. 1	3	3	3									3
CO308. 2		3	3	3								3
CO308. 3		3	3	3		3						3
CO308. 4		3	3	3								3

1Low 2Medium 3High

19GE3M01 COMMUNICATION AND SOFT SKILLS	**L**	**T**	**P**	**C**
	0	**0**	**2**	**-**

OBJECTIVES:

1. Provide Guidance and Practice to communicate in English.

2. Provide support to read from different genres.

3. Practice to write technical articles.

4. Understand the Importance of Soft skills

5. Improve Personality Traits

PREREQUISITE:

 The pre-requisite knowledge required by the Students to study this Course is the fundamental knowledge in English Language.

UNIT I   LISTENING SKILLS   6

Conversational skills (formal and informal)- group discussion- making effective presentations using computers, listening/watching interviews conversations, documentaries. Listening to lectures, discussions from TV/ Radio/ Podcast.

UNIT II   READING AND WRITING SKILLS   6

Reading different genres of tests ranging from newspapers to creative writing.Writing job applications - cover letter – resume - emails - letters - memos - reports. Writing abstracts - summaries- interpreting visuals.

UNIT III   WRITING STRATEGIES   6

Introduction to Writing Strategies – Different genres of writing – Organizing ideas from Journal writings – Note- Making

UNIT IV   PERSONALITY TRAITS – AN OVERVIEW   6

Definition – Types – Openness to experience – Conscientiousness – extraversion – Agreeableness - Neuroticism

UNIT V   SOFT SKILLS   6

Motivation – self image – goal setting – managing changes – time management – stress management – leadership traits – team work – career and life planning.

TOTAL HOURS: 30

TEXT BOOKS(S):

1. Brooks, Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press: Oxford, 2011.
2. Mitra, K. Barun. Personality Development and Soft Skills. Oxford University Press: Oxford, 2016.

REFERENCE(S):

1. Personality Development (CD-ROM), Times Multimedia, Mumbai.
2. Bhatnagar, Nitin and Mamta Bhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

COURSE OUTCOME(S):

CO309. 1   Talk in English in real life situations

CO309. 2   Make effective presentations

CO309. 3   Participate in GD and contribute ideas with ease.

CO309. 4   Master soft skills required for the work place.

CO309. 5   Write letters and technical writing.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l

CO309. 1			1			1		3	3	1	2
CO309. 2			1			1		3	3	1	2
CO309. 3			1			1		3	3	1	2
CO309. 4			1			1		3	3	1	2
CO309. 5			1			1		3	3	1	2

1Low 2Medium 3High

19IT3AP1   APTITUDE I   **L T P C**
                                                                        0 1 0 -

OBJECTIVES:
1. To enhance the problem-solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of competitive examinations.

PREREQUISITE:
- Fundamental mathematics

UNIT I :   **5**

Number Systems, Ratio & Proportion, Percentage & Averages,

UNIT II :   **5**

Mixtures &Alligations, Surds & Indices, Time & Distance

UNIT III :   **5**

Profit & Loss, Simple Interest & Compound Interest,

REFERENCE(S):
1. https://www.edutechlearners.com/quantitative-aptitude-by-r-s-aggarwal-pdf/
2. http://www.visionias.net/2016/12/rs-aggarwal-quantitative-aptitude-free.html
3. Quantitative Aptitude by Dr.R.S.Agarwal

COURSE OUTCOMES:

CO310. 1   Enhances the employability skills of the students.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO310. 1		3	3	3								

1Low 2Medium 3High

Assessment Pattern: Three Assessments one on each unit.

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
IV SEMESTER

Code No.	Course	Category	L	T	P	C	H
FOURTH SEMESTER							
19IT4601	Data Base Systems	PC	3	0	0	3	3
19IT4602	Data Communication and Computer Networks	PC	3	0	0	3	3
19IT4603	Microprocessor and Microcontrollers	PC	2	0	2	3	4
19IT4604	Operating Systems	PC	3	0	0	3	3
19IT4605	Software Engineering Methodologies	PC	3	0	0	3	3
19IT4611	Data Base Systems Laboratory	PC	0	0	4	2	4
19IT4612	Networks Laboratory	PC	0	0	4	2	4
19IT4613	Operating Systems Laboratory	PC	0	0	4	2	4
19IT4111	Interpersonal Skills Essentials	HSS	0	0	2	2	2
19GE4M01	Environmental Science and Engineering	HSS	2	0	0	0	2
19IT4AP2	Aptitude – II		1	0	0	-	1
			17	**0**	**16**	**23**	**33**

19IT4601   DATA BASE SYSTEMS   **L T P C**

3 0 0 3

Course Objectives

1. Understand the role of a database management system in an organization.
2. Understand basic database concepts, including the structure and operation of the relational data model.
3. Construct simple &Nested database queries using Structured Query Language (SQL).
4. Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
5. Understand the concept of a database transaction and related database facilities, including concurrency control, and data object locking and protocols.

PREREQUISITE:

 Data Structures

UNIT I   INTRODUCTION   9

Terminologies - DBMS Components – Overview of DBMS Architecture, Characteristics of Database approach, Advantages of using DBMS approach, Applications of DB - Data Independence, Database System Environment - Classification of DBMS – Overview of databases – Oracle, Sybase and DB2 - Data Models – Types of Data Models – Database Users – Role of DBA.

UNIT II   RELATIONAL DATABASE DESIGN   9

Relational Model – Terminologies - Relational Algebra and Calculus – Integrity constraints - Normal Forms – Importance of a good schema design, Data base design using ER model – ER Diagram - Motivation for Normal forms, Definitions of 1NF, 2NF, 3NF and BCNF, Decompositions.

UNIT III   SQL   12

Schema Definitions, Basic Constraints and Queries - Overview of Database Query Languages – SQL, PL/SQL and MySQL, SQL data definition and data types, basic constraints – DDL, DML Statements- Queries - Aggregate Queries - Sub Queries , Views , Indexes , Data Dictionary – Query processing - Query optimization. Programming Language Extension to SQL (PL/SQL) – Fundamentals, Control Structures, Data Manipulations, Stored Procedures and Functions

UNIT IV   TRANSACTION AND QUERY PROCESSING   9

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT V   ENTERPRISE DB ARCHITECTURE   6

Two tier architecture, Three tier architecture - RAID - Database Connectivity, ODBC Driver, JDBC Driver – Distributed Databases - Data warehouse – Data mining – XML

TOTAL HOURS: 45

TEXT BOOK(S):

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, ―Database System Concepts‖,Sixth Edition, Tata McGraw Hill, 2011

2. Ramez Elmasri, Shamkant B. Navathe, ―Fundamentals of Database Systems‖, Sixth Edition,Pearson, 2011.

REFERENCE(S):

1. C. J. Date, A.Kannan, S. Swamynathan, ―An Introduction to Database Systems‖, Eighth Edition, Pearson Education, 2006.

2. Raghu Ramakrishnan, ―Database Management Systems‖, Fourth Edition, McGraw-Hill College Publications, 2015.

3. G.K.Gupta,"Database Management Systems‖, Tata McGraw Hill, 2011.

WEB REFERENCES:

1. www.sqlcourse.com
2. www.nptel.ac.in , www.w3schools.com
3. www.oracletutorial.com

COURSE OUTCOME(S):

CO401. 1   Understand the concepts of Data Base Management System.

CO401. 2   Understand Entity Relationship (ER) diagrams and design databases for applications.

CO401. 3   Demonstrate how to Create, alter and modify databases.

CO401. 4   Use stored procedures and functions to interact with the databases.

CO401. 5   Apply normalization techniques and database connectivity to design a database for a given application

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO401. 1	3											
CO401. 2	3	2	3	3	3							
CO401. 3	3	3	3	3	3	3						
CO401. 4	3	3	3	3	3	3						
CO401. 5	3	3	3	3	3	3						3

1Low 2Medium 3High

19IT4602   DATA COMMUNICATION AND COMPUTER NETWORKS

L T P C

3 0 0 3

OBJECTIVES:

1. To understand modulation and the protocol layering and physical level communication.
2. To analyze the performance of a network.
3. To understand the various components required to build different networks.
4. To learn the functions of network layer and the various routing protocols.
5. To familiarize the functions and protocols of the Transport layer.

PREREQUISITE:

 19IT3603 – Information Theory and Coding, 19IT3201 – Probability & Statistics

 19IT3501 – Digital Principles and System Design

UNIT – I   BASICS OF DATA COMMUNICATION AND NETWORKS   9

Modulation: PCM, ASK, FSK, PSK – Connectionless and Connection oriented Services - Networks – Network Types – Protocol Layering – OSI Model – TCP/IP Protocol suite – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching.

UNIT II   DATA-LINK LAYER & MEDIA ACCESS   9

Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols –

HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III   NETWORK LAYER   9

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

UNIT IV   TRANSPORT LAYER   9

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP.

UNIT V   APPLICATION LAYER   9

WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP – Internet – Resource sharing - Cloud Infrastructure – Services.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. Andrew S Tanenbaum and David J Wetherall, ―Computer Networks‖, Prentice Hall, New Delhi, 2012.

REFERENCE(S):

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
5. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

COURSE OUTCOMES:

CO402. 1   Understand the basic of data communication and layering in computer networks.

CO402. 2   Evaluate the performance of a network.

CO402. 3   Understand the basics of how data flows from one node to another and design routing algorithms.

CO402. 4   Design protocols for various functions in the network.

CO402. 5   Understand the working of various application layer protocols

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO402. 1	3											
CO402. 2	3	3	3	3	3							
CO402. 3	3	3	3	3	3		3	3				3
CO402. 4	3	3	3	3	3							3
CO402. 5	3											3

1Low 2Medium 3High

19IT4603   MICROPROCESSOR AND MICROCONTROLLERS

L T P C
2 0 2 3

OBJECTIVES:

1. To understand the Architecture of 8086 microprocessor.
2. To learn the design aspects of I/O and Memory Interfacing circuits.
3. To interface microprocessors with supporting chips.
4. To study the Architecture of ARM microcontroller.
5. To design a microcontroller based system

PREREQUISITE:

 19IT3501   Digital Principles and System Design

 19IT3601   Computer Organisation and Architecture

UNIT I   THE 8086 MICROPROCESSOR   6

Pin diagram, CPU architecture, Segmentation- Minimum mode maximum mode operations - Memory Interfacing-I/O interfacing

UNIT II   PROGRAMMING MODEL OF 8086   7

Programming model of 8086, Addressing modes, Instruction Formats, Instruction set, Assembler directives and Assembly language Programming of 8086.

UNIT III   I/O INTERFACING   7

Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller.

UNIT IV   ARM MICROCONTROLLER   5

Introduction to Microcontrollers - ARM Microcontrollers – ARM Processor Family – Applications of ARM Processor – LPC2148 ARM 7 Microcontroller – Features of LPC2148 – Block Diagram of LPC2148 – Pin Diagram of LPC2148 – Architectural Overview – On-Chip Memory.

UNIT V   INTERFACING WITH ARM   5

Interfacing LEDs and Switches – Interfacing Keypads – Interfacing Seven Segment Display – Interfacing LCD – Interfacing Relay- Interfacing DC Motor – Interfacing Stepper Motor – 10 bit ADC Features Interfacing Temperature Sensor LM35 – 10bit DAC Features - Interfacing DAC – PWM Audio.

TOTAL HOURS: 30

Lab Experiments   **Total :30 periods**

8086 Programs

- Basic arithmetic and Logical operations
- Move a data block without overlap
- Floating point operations, string manipulations, sorting and searching

Peripherals and Interfacing Experiments

- Traffic Light Controller
- Digital clock
- Key board and Display
- Printer status
- Serial interface and Parallel interface
- A/D and D/A interface and Waveform Generation

Experiments on ARM

- Study of ARM evaluation system

- Interfacing ADC and DAC.
- Interfacing LED & LCD (Seven Segment Display)
- Interfacing Temperature Sensor

Requirements

- Embedded trainer kits with ARM board 10 No.s
- 8086 Kits :10 Nos.
- ADC Board : 10 Nos.
- DAC Board: 10 Nos.
- LED board : 10 Nos.

TOTAL HOURS: 60

TEXT BOOK(S):

1. Yu-Cheng Liu, Glenn A.Gibson, ―Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design‖, Second Edition, Prentice Hall of India, 2007.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, ―The 8051 Microcontroller and Embedded Systems: Using Assembly and C‖, Second Edition, Pearson education, 2011.
3. Steve Furber- ARM System-on-Chip Architecture- Second Edition- Pearson-2012.
4. Trevor Martin- Hitex- ARM7-Based Microcontrollers-The Insider‟s Guide To The Philips.

REFERENCE(S):

1. Doughlas V.Hall, ―Microprocessors and Interfacing, Programming and Hardware‖,TMH,2012
2. A.K.Ray,K.M.Bhurchandi,‖Advanced Microprocessors and Peripherals ―3rd edition, Tata McGrawHill,2012.
3. J.R.Gibson- ARM Assembly Language- Second Edition- Cengage Learning
4. Warwick A.Smith- ARM Microcontroller Interfacing Hardware and Software- Elektor (www.elecktor.com)

WEB REFERENCES:

1. www.tutorialspoint.com/microprocessor
2. www.nptel.ac.in

COURSE OUTCOMES:

CO403. 1   Understand the architecture of 8086.

CO403. 2   Understand and execute programs based on 8086 microprocessor.

CO403. 3   Design Memory Interfacing circuits.

CO403. 4   Design and interface I/O circuits.

CO403. 5   Design and implement ARM microcontroller based systems

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO403. 1	3											
CO403. 2	3	2	3		3							
CO403. 3	3	2	3	3	3							
CO403. 4	3	2	3	3	3							
CO403. 5	3	2	3	3	3							3

1Low 2Medium 3High

19IT4604   OPERATING SYSTEMS   **L T P C**

                                                      3 0 0 3

OBJECTIVES:

1. To understand the basic concepts and functions of operating systems.

2. To understand Processes and Threads

3. To analyze Scheduling algorithms.

4. To understand the concept of Deadlocks.

5. To analyze various memory management schemes.

6. To understand I/O management and File systems.

7. To be familiar with the basics of Linux system and Mobile OS like iOS and Android.

PREREQUISITE:

  Data Structures, OS Installation

UNIT I   OPERATING SYSTEM AND PROCESS OVERVIEW   9

Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot. Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication

UNIT II   PROCESS SCHEDULING AND DEADLOCK   9

CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III   STORAGE MANAGEMENT   9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV   FILE SYSTEMS AND I/O SYSTEMS   9

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

UNIT V   CASE STUDY   9

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

Total: 45 Periods

TEXT BOOK (S):

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, ―Operating System Concepts, 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCE(S):

1. Ramaz Elmasri, A. Gil Carrick, David Levine, ―Operating Systems – A Spiral Approach, Tata McGraw Hill Edition, 2010.

2. Achyut S.Godbole, Atul Kahate, ―Operating Systems, Mc Graw Hill Education, 2016.

3. Andrew S. Tanenbaum, ―Modern Operating Systems, Second Edition, Pearson Education, 2004.

4. Gary Nutt, ―Operating Systems, Third Edition, Pearson Education, 2004.

5. Harvey M. Deitel, ―Operating Systems, Third Edition, Pearson Education, 2004.

6. Daniel P Bovet and Marco Cesati, ―Understanding the Linux kernel, 3rd edition, O‚Reilly, 2005.

7. Neil Smyth, ―iPhone iOS 4 Development Essentials – Xcode, Fourth Edition, Payload media

WEB REFERENCES

1. www.systutorials.com ,www.javatpoint.com/os-tutorial

2. www.tutorialspoint.com

COURSE OUTCOME(S):

CO404. 1   Understand the concept of Operating system and process

CO404. 2   Apply process scheduling algorithm and deadlock Management

CO404. 3   Compare and contrast various memory management schemes.

CO404. 4   Understand the functionality of file systems and I/O systems.

CO404. 5   Perform administrative tasks on Linux Servers and Compare iOS and Android Operating Systems.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO404. 1	3											
CO404. 2	3	3	3									
CO404. 3	3	3	3	3								

| CO404. 4 | 3 | | | | | | 3 | | | | | 3 |
| CO404. 5 | 3 | 3 | 3 | 3 | 3 | | 3 | | | | | 3 |

1Low 2Medium 3High

19IT4605   **SOFTWARE ENGINEERING METHODOLOGIES**

                                                      L   T   P   C
                                                      3   0   0   3

OBJECTIVES:
The course will enable students :

- To understand the concepts of process, product and project development.

- To elucidate the knowledge of requirement analysis & to provide the knowledge of software design.

- To provide the knowledge of software design and testing.

- To introduce the project management techniques.

- To learn the basics of OO analysis and design skills

- To earn the UML design diagrams

PREREQUISITE:

- The students should have conceptual thinking.

UNIT I   INTRODUCTION   9

Software Engineering Paradigms – Waterfall Life Cycle Model – Spiral Model – Prototype Model – Agile Process Model: SCRUM– Unified Process Model – DevOps – Planning – Software Project Scheduling.

UNIT II   SOFTWARE REQUIREMENT ANALYSIS AND DESIGN   9

Software requirements and specifications- Requirements elicitation- Requirements analysis modeling techniques- Functional and nonfunctional requirements- User requirements, System requirements, requirement validation and software requirement specification document. Designing Concepts - Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Dataflow Oriented Design - Jackson System Development - Case Study : Design for any Application Oriented Project.

UNIT III   SOFTWARE TESTING AND MAINTENANCE   9

Software Testing Fundamentals – Software Testing Strategies – Black Box Testing – White Box Testing – System Testing – Object Orientation Testing – State Based Testing - Testing Tools – Test Case Management – Types of Maintenance – Case Study: Testing Techniques.

UNIT IV   OBJECT ORIENTED ANALYSIS AND DESIGN   7

An Overview of Object Oriented Systems Development - Object Basics – Object Oriented Systems Development Life Cycle – Pattern.

UNIT V   UML DIAGRAMS   11

UML – Static and Dynamic models – Need for modeling – UML Diagrams – UML Class Diagram – Use Case Diagram – UML Dynamic Modeling. Case study: ATM, Stock Maintenance.

TOTAL HOURS: 45

TEXT BOOKS(S):

1. Roger S. Pressman, ―Software Engineering – A Practitioner‚s Approach‖, McGraw Hill, Singapore, 2014.
2. Ian Sommerville, ―Software Engineering‖, Addison Wesley, New Delhi, 2015.
3. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 1999

REFERENCE(S):

1. Fairley R., ―Software Engineering Concepts‖, Tata McGraw Hill, New Delhi, 2008.
2. Harry Hariom Choudhary , ―Java Coding Standards‖, Amazon Kindle, USA, 2013.
3. Bernard Homes., ―Fundamentals of Software Testing‖, Wiley & Sons, USA, 2012.
4. Martin Fowler, "UML Distilled", Second Edition, PHI/Pearson Education, 2002.
5. Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw-Hill, 2003.
6. James Rum Baugh, Ivar Jacobson, Grady Booch "The Unified Modeling Language Reference Manual", Addison Wesley, 1999.

WEB REFERENCES:

1. http://www.dau.mil/pubs/pdf/SEFGuide 01-01.pdf
2. http://sites.computer.org/ccse/SE2004Volume.pdf
3. http://www.dcnicn.com/BusinessNews/WVU-MIS13Apr00/Software-Engineering.pdf
4. www.comp.lancs.ac.uk/computing/resources/IanS/SE7/Presentations/PDF/ch1.pdf

COURSE OUTCOME(S):

CO405. 1   Analyze the software development life cycle.

CO405. 2   Apply the Requirement engineering process with emphasis on elicitation analysis and modelling for any given software requirement and identify

appropriate design strategies and analyze the requirement specifications for any software system

CO405. 3 Test and implement the software which is developed for multidisciplinary approaches.

CO405. 4 Understand the basics of Object oriented system development.

CO405. 5 Design applications using UML diagrams

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO405. 1	3	3	3	3								
CO405. 2	3	3							3			
CO405. 3	3	3	3	3								
CO405. 4	3	3	3									
CO405. 5	3	3	3	3	3				3			3

1Low 2Medium 3High

19IT4611   DATA BASE SYSTEMS LABORATORY   **L T P C**
                                                        0 0 4 2

OBJECTIVES:

The course will enable students to:

- To understand data definitions and data manipulation commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of data bases
- To be familiar with the use of a front end tool
- To understand design and implementation of typical database applications

PREREQUISITE:

- File Handling

LIST OF EXERCISES

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements

2. Database Querying – Simple queries, Nested queries, Sub queries and Joins

3. Views, Sequences, Synonyms

4. Database Programming: Implicit and Explicit Cursors

5. Procedures and Functions

6. Triggers

7. Exception Handling

8. Database Design using ER modeling, normalization and Implementation for any application

9. Database Connectivity with Front End Tools

10. Case Study using real life database applications

TOTAL HOURS: 60

COURSE OUTCOME(S):

CO406. 1   Use typical data definitions and manipulation commands.

CO406. 2   Design applications to test Nested and Join Queries

CO406. 3   Implement simple applications that use Views

CO406. 4   Implement applications that require a Front-end Tool

CO406. 5   Critically analyze the use of Tables, Views, Functions and Procedures

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO406. 1	3	3	3	3	3			3				3
CO406. 2	3	3	3	3	3			3				3
CO406. 3	3	3	3	3	3			3				3
CO406. 4	3	3	3	3	3			3				3
CO406. 5	3	3	3	3	3			3				3

1Low 2Medium 3High

19IT4612   NETWORKS LABORATORY   **L T P C**
                                                          0 0 4 2

OBJECTIVES:

 To learn and use network commands.

 To learn socket programming.

 To implement and analyze various network protocols.

 To learn and use simulation tools.

 To use simulation tools to analyze the performance of various network protocols.

PREREQUISITE:

 Basic JAVA programming

LIST OF EXPERIMENTS

- Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
- Write a HTTP web client program to download a web page using TCP sockets.
- Applications using TCP sockets like:
  - o Echo client and echo server
  - o Chat
  - o File Transfer
- Simulation of DNS using UDP sockets.
- Write a code simulating ARP /RARP protocols.
- Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
- Study of TCP/UDP performance using Simulation tool.
- Simulation of Distance Vector/ Link State Routing algorithm.
- Performance evaluation of Routing protocols using Simulation tool.
- Simulation of error correction code (like CRC).

TOTAL HOURS : 60

COURSE OUTCOME(S):

CO407. 1   Implement various protocols like TCP and UDP.

CO407. 2   Compare the performance of different transport layer protocols.

CO407. 3   Use simulation tools to analyze the performance of various network protocols.

CO407. 4   Analyze various routing algorithms.

CO407. 5   Implement error correction codes.

PO vs CO MAPPING

CO. No	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO407. 1	3	3	3	3	3							
CO407. 2	3	3	3	3	3							
CO407. 3	3	3	3	3	3		3					3
CO407. 4	3	3	3	3	3		3					3
CO407. 5	3	3	3	3	3		3					3

1Low 2Medium 3High

19IT4613   OPERATING SYSTEMS LABORATORY   **L T P C**

                                                                                          0 0 4 2

OBJECTIVES:

   ▢   To learn Unix commands and shell programming

   ▢   To implement various CPU Scheduling Algorithms

   ▢   To implement Process Creation and Inter Process Communication.

   ▢   To implement Deadlock Avoidance and Deadlock Detection Algorithms

   ▢   To implement Page Replacement Algorithms

   ▢   To implement File Organization and File Allocation Strategies

PREREQUISITE: 19IT2502 – C Programming

List of Experiments

1. Basics of UNIX commands

2. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir

3. Write C programs to simulate UNIX commands like cp, ls, grep, etc.

4. Shell Programming

5. Write C programs to implement the various CPU Scheduling Algorithms

6. Implementation of Semaphores

7. Implementation of Shared memory and IPC

8. Bankers Algorithm for Deadlock Avoidance

9. Implementation of Deadlock Detection Algorithm

10. Write C program to implement Threading & Synchronization Applications

11. Implementation of the following Memory Allocation Methods for fixed partition

      a.   First Fit

      b.   Worst Fit

      c.   Best Fit

12. Implementation of Paging Technique of Memory Management

13. Implementation of the following Page Replacement Algorithms

      a.   FIFO
      b.   LRU
      c.   LFU

14. Implementation of the various File Organization Techniques

15. Implementation of the following File Allocation Strategies

    a. Sequential

    b. Indexed

    c. Linked

TOTAL HOURS :60

COURSE OUTCOME(S):

CO408. 1   Simulate the basic UNIX Commands using system calls and simulate the utility code using shell programming.

CO408. 2   Compare the performance of various CPU Scheduling Algorithms

CO408. 3   Implement Deadlock avoidance and Detection Algorithms

CO408. 4   Implement Semaphores

CO408. 5   Create processes and implement IPC

CO408. 6   Analyze the performance of the various Page Replacement Algorithms

CO408. 7   Implement File Organization and File Allocation Strategies

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO408. 1	3											
CO408. 2	3	3	3									
CO408. 3	3	3	3									
CO408. 4	3	3	3	3								
CO408. 5	3	3	3									
CO408. 6	3	3	3									
CO408. 7	3	3	3			3						3

1Low 2Medium 3High

19IT4111   INTERPERSONAL SKILLS ESSENTIALS   **L T P C**
                                                          0 0 2 2

OBJECTIVES:

1. Recognize the characteristics of competent communication in dyadic interactions.

2. Demonstrate the ability to assess the appropriateness and effectiveness of interpersonal strategies used in various interpersonal situations.

3. Demonstrate skill in selecting and using a variety of communication strategies and responses based on situational contexts, goals, and human needs.

4. Recognize the ethical dimensions of interpersonal skills.

PREREQUISITE:

 The pre-requisite knowledge required by the Students to study this Course is the fundamental knowledge in English Language.

UNIT I   VERBAL COMMUNICATION   6

Introducing Interpersonal Communication - Considering Self - Perceiving Others - Determine project topic and questions for Improving - Interpersonal Communication – Oral Presenting of innovative ideas – Assignment analysis.

UNIT II   DECISION-MAKING   6

Introduction - Objectives and Expectations - Classifying Decisions   - valuating Alternatives: Plus-Minus-Implication **–** Project Direction – Writing down decision statements - Understanding Culture - Evaluating Alternatives: Paired Comparison **-** Supportive Listening Skills Demonstration **-** Team Decision Making - Communicating Verbally **-** Conflict Analysis - Visual idea Presentation .

UNIT III   PROBLEM-SOLVING   6

Identifying problems – Writing problem statement, Analyzing the situation -Gathering information related to the problem stated - Identifying solution criteria - Choosing the best solution - Implementing a solution – writing solution content - Measuring solution success – Report preparation.

UNIT IV   CRITICAL THINKING AND INFORMATION ANALYSIS   6

Critical thinking Introduction - Developing reasoning and logical skills - Discussing forecasting techniques – Writing Quantitative analysis - Discussing mind mapping.

UNIT V   NEGOTIATION SKILLS   6

Understanding the hidden complexities and dynamics of negotiation - Internalising the roles played by relationships, trust and rapport - Strategically preparing for any negotiation scenario – writing implementation and compliance statements.

TOTAL HOURS : 30

TEXT BOOK(S):

1. Pease, Allan and Barbara Pease. The Definitive Book of Body Language. New Delhi: Manjul Publishing House, 2005.

2. Robbins P.Stephen, Hunsaker l.Philip.Training in Interpersonal Skill. 6th Edition. NewDelhi: Pearson, 2015.

REFERENCE(S):

1. Personality Development (CD-ROM), Times Multimedia, Mumbai.
2. HAYES, Interpersonal Skills at Work. Mcgraw Hill Education: Bengaluru, 2002.

WEB RESOURCE(S):

1. Interpersonal Communication https://www.youtube.com/watch?v=L8NhxVXopaU
2. Decision Making https://www.youtube.com/watch?v=pPIhAm_WGbQ
3. Problem Solving https://www.youtube.com/watch?v=DCjC_cG4vF4
4. Critical Thinking https://www.youtube.com/watch?v=J0yEAE5owWw
5. Negotiation Skills https://www.youtube.com/watch?v=DZntD2KEJs0

COURSE OUTCOME(S):

CO409. 1   Civic and Cultural Awareness: Analyzing and critiquing competing perspectives in a democratic society; comparing, contrasting, and interpreting differences and commonalities among peoples, ideas, aesthetic traditions, and cultural practices.

CO409. 2   Critical Thinking: Gathering, analyzing, synthesizing, evaluating and applying information.

CO409. 3   Personal Responsibility: Identifying and applying ethical principles and practices; demonstrating effective learning, creative thinking, and personal responsibility.

CO409. 4   Interpersonal Skills: Interacting collaboratively to achieve common goals.

CO409. 5   Written, Oral, and Visual Communication: Communicating effectively, adapting to purpose, structure, audience, and medium.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO409. 1		1	2	2		3	3	2	2	2	2	2
CO409. 2		1	3	2							3	
CO409. 3		1	2			3			2	2		
CO409. 4		1	2						3	3	1	1
CO409. 5		1	2							3	2	

1Low 2Medium 3High

19GE4M01   ENVIRONMENTAL SCIENCE AND ENGINEERING   L T P C

2 0 0 -

OBJECTIVES:

1. To find and implement scientific, technological, economic and political solutions to environmental problems.
2. To study the interrelationship between living organism and environment.
3. To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
4. To study the dynamic processes and understand the features of the earth‟s interior and surface.
5. To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

PREREQUISITE:

   Basic theoretical concepts of biological science in higher secondary level.

UNIT I   ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY   7

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – ecological succession– Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) pond ecosystem (d) ocean ecosystem – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity–India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity– endangered and endemic species of India –In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II   ENVIRONMENTAL POLLUTION   6

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution– solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III   NATURAL RESOURCES   6

Forest resources: Use and over-exploitation, deforestation - timber extraction– Water resources: Use and over- utilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Role of an individual in conservation of natural resources.

UNIT IV   SOCIAL ISSUES AND THE ENVIRONMENT   6

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – consumerism and waste products – environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act

UNIT V   HUMAN POPULATION AND THE ENVIRONMENT   5

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL HOURS: 30

TEXT BOOK(S):

1. Benny Joseph, „Environmental Science and Engineering‟, Tata McGraw-Hill, New Delhi, 2006.

2. Gilbert M.Masters, „Introduction to Environmental Engineering and Science‟, 2nd edition, Pearson Education, 2004.

REFERENCE(S):

1. Dharmendra S. Sengar, „Environmental law‟, Prentice hall of India Pvt Ltd, New Delhi, 2007.

2. Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) Pvt, Ltd, Hydrabad, 2015.

3. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.

4. Rajagopalan, R, „Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.

COURSE OUTCOME(S):

CO410. 1   The student will acquire knowledge about the different biodiversity species and their importance.

CO410. 2   The student can classify problems related to the environmental degradation.

CO410. 3   The Students will attain greater knowledge of how natural resources relate to the economy and environment at present and in the future.

CO410. 4   The student can identify a societal problem and to develop a plan of action to address the issues.

CO410. 5   The student can analyse the changes due to population explosion.

PO vs COMAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO410. 1							2	2				
CO410. 2						3	3	1				
CO410. 3								3				
CO410. 4						3	3					
CO410. 5						2		1				

1Low 2Medium 3High

19IT4AP2   APTITUDE II   **L T P C**

                                    1 0 0 -

OBJECTIVES:

1. To enhance the problem solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of competitive examinations.

PREREQUISITE:

    Basic Mathematics.

UNIT I :   **5**

Sequence & Series Permutation Combination & Probability,

UNIT II :   **5**

Mensuration - Cylinder, Cone, Sphere, Quadratic Equations, Data Interpretation,

UNIT III :   **5**

Problems on Trains - Fractions problems - Numbers and Ages Percentage problems

Reference(s):

1.   https://www.edutechlearners.com/quantitative-aptitude-by-r-s-aggarwal-pdf/

2.   http://www.visionias.net/2016/12/rs-aggarwal-quantitative-aptitude-free.html

3.   Quantitative Aptitude by Dr.R.S.Agarwal

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
V SEMESTER

FIFTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19IT5601	Web Programming	PC	3	0	2	4	5
19IT5602	Virtualization and Cloud Computing	PC	3	0	0	3	3
	Professional Elective – I	PE	3	0	0	3	3
	Professional Elective – II	PE	3	0	0	3	3
	Open Elective I	OE	3	0	0	3	3
	Open Elective II	OE	3	0	0	3	3
19IT5611	Virtualization & Cloud Computing Laboratory	PC	0	0	4	2	4
19IT5M01	Indian Constitution	HSS	1	0	0	-	1
19IT5AP3	Aptitude – III		2	0	0	-	2
		TOTAL	**20**	**0**	**8**	**21**	**29**

19IT5601   WEB PROGRAMMING   **L T P C**

3 0 2 4

OBJECTIVES:

The course will enable students to:

1. To learn Markup languages and Style Sheets for web design
2. To familiarize with Client-Side Programming and host objects
3. To explore Client-Side Programming and Server-Side Programming
4. To discover the use of XML
5. To learn about web services and create web services

PRE-REQUISITE:

 Basics of Information Technology

UNIT I   WEB ESSENTIALS AND MARKUP LANGUAGES   9

Web Essentials - Clients – Servers – Communication - The Internet - Basic Internet Protocols –World Wide Web - HTTP Request Message - Response Message - Web Clients - Browsers - Web Servers – Access Control – Secure Servers - Case Study - Markup Languages – XHTML - Client Tier using HTML – History and Versions - Basic XHTML Syntax and Semantics - HTML Elements - Relative URLs – Lists – Tables – Frames – Forms – HTML5 Elements – Video on the Web - Creating HTML Documents Case Study

UNIT II   STYLE SHEETS AND CLIENT-SIDE PROGRAMMING   9

Style Sheets - Look and feel using Cascading Style Sheets – Features - Core Syntax - Style Sheets and HTML - Style Rule Cascading and Inheritance - Text Properties - Box Model - Normal Flow Box Layout - Beyond the Normal Flow - Other Style Properties - Client-Side Programming - JavaScript Language - History and Versions - JavaScript in Perspective – Syntax - Variables and Data Types – Statements – Operators – Literals – Functions – Objects – Arrays - Built-in Objects –Regular Expression - Validations - JavaScript Debuggers.

UNIT III   HOST OBJECTS AND SERVER-SIDE PROGRAMMING   9

Host Objects - Document Object Model - Intrinsic Event Handling - Modifying Element Style - Document Tree - DOM Event Handling - Server-Side Programming - Java Servlets - Architecture - Generating Dynamic Content – Life Cycle - Parameter Data – Sessions - Cookies - URL Rewriting - Other Servlet Capabilities - Data Storage - Servlets and Concurrency - Case Study.

UNIT IV   SEPARATING PROGRAMMING AND PRESENTATION AND REPRESENTING WEB DATA   9

Separating Programming and Presentation - Presentation tier using JSP - JSP and Servlets - Running JSP Applications - JavaBeans Classes and JSP - Standard Tag Libraries and Files - Support for the Model-View Controller Paradigm - Case Study - Representing Web Data - XML - Documents and Vocabularies - Versions and Declaration - Namespaces - JavaScript and XML - Ajax - DOM based XML processing - Event-oriented Parsing - SAX - Transforming XML Documents - Selecting XML Data - XPATH - Template-based Transformations - XSLT - Displaying XML Documents in Browsers - Case Study

UNIT V   WEB SERVICES   **9**

Web Services Building Blocks - SOAP - SOAP Syntax - Sending SOAP messages - SOAP Implementations - Future of SOAP - Web Services Building Blocks - WSDL and UDDI - WSDL Syntax - SOAP Binding -Other Bindings - UDDI - UDDI API – The Future of UDDI

TOTAL HOURS : 45

LAB EXERCISES:
1. Create a web page with the following using HTML.
   - To embed an image map in a web page.
   - To fix the hot spots.
   - Show all the related information when the hot spots are clicked
2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML.
4. Installation of Apache Tomcat web server.
5. Write programs in Java using Servlets: To invoke servlets from HTML forms. Session Tracking.
6. Write programs in Java to create three-tier applications using JSP and Databases
7. For conducting on-line examination.
8. For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
9. Programs using XML – Schema – XSLT/XSL.
10. Programs using DOM and SAX parsers.
11. Programs using AJAX.
12. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Data base.

TOTAL HOURS : 30

TEXT BOOK(S):

1. Kogent Learning Solutions Inc., "Web technologies HTML, JavaScript, PHP, Java, JSP, ASP.net, XML and AJAX Black Book" Dreamtech Press, 2018

2. N. P. Gopalan, T. A. Adikesavan, "Web Technology: A Developer"s Perspective", Second Edition, PHI Learning Private Limited, 2014.

REFERENCE(S):

1. Ron Schmelzer et al. "XML and Web Services Unleashed" SAMS,2002

2. Jeffrey C.Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2007.

3. Mark Pilgrim, "HTML5: Up and Running", O"Reilly, 2012.

4. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Seventh Edition, 2012.

5. H.M.Deitel, P.J.Deitel, Goldberg, "Internet & World Wide Web How To Program", Pearson Education, Third Edition, 2006.

6. Marty Hall and Larry Brown, "Core Web Programming", Volume I and II, Pearson Education, Second Edition, 2010.

7. Bates, "Developing Web Applications", Wiley, 2008.

WEB RESOURCE(S):

1. www.w3schools.com

COURSE OUTCOMES:

CO501.1   Design web pages using Markup languages and Cascading Style

Sheets CO510.2   Implement Client-Side Programming using Java Script and

DOM CO501.3   Use web platform for information sharing with Servlets and JSP

CO501.4   Use XML Technologies

CO501.5   Develop Web Services for Online communities in the Business World

PO vs CO MAPPING:

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO501.1	3					3				3		
CO501.2			3					3				3
CO501.3						3						
CO501.4		3		3			3		3	3		
CO501.5			3		3			3			3	

1Low 2Medium 3High

19IT5602   VIRTUALIZATION AND CLOUD COMPUTING   L T P C
                                                         3 0 0 3

OBJECTIVES:

1. Analyze the basic concepts of virtualization technology to derive the best practice model for deploying cloud based applications.
2. Identify major security and privacy problems in cloud computing environment.
3. Illustrate the applications of cloud.

PRE-REQUISITE:

 Basic knowledge of operating system, virtual machine and networks.

UNIT I   INTRODUCTION TO CLOUD COMPUTING   9

Historical developments – Cloud computing at a glance – Cloud Computing Architecture: The cloud reference model, Characteristics – Cloud deployment model – Cloud service model – Pros and Cons of cloud.

UNIT II   FUNDAMENTALS OF VIRTUALIZATION   9

Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

UNIT III   VIRTUALIZATION TECHNIQUES   9

Storage Virtualization – System-level or Operating Virtualization – Control-Plane Virtualization–Virtual Machine Basics – Taxonomy of Virtual machines - Server Virtualization – Physical and Logical Partitioning - Types of Server Virtualization.

UNIT III   PROGRAMMING MODEL   9

Introduction to Hadoop Framework – Hadoop file system Architecture – Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – dataflow of File read & File write.

UNIT IV   SECURITY   9

Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

UNIT V   **CLOUD COMPUTING FRAMEWORK**   **9**

Amazon EC3, Azure Cloud, Aneka framework, Google AppEngine, Cloud Applications.

TOTAL HOURS: 45

TEXT BOOKS(S):

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012.

2. Rajkumar Buyya, Christian Vecchiola and Thamarai Selvi S,Mastering in Cloud Computing, McGraw Hill Education, (India) Private Limited, 2013.

REFERENCE BOOK(S):

1. Matthew Portney , Virtualization Essentials, John Wiley & Sons, Second Edition, 2016.

2. Kailash Jayaswal, Jagannath Kallakurchi,Donald J.Houde,Dr.devan Shah, Cloud Computing Black Book, Dreamtech press ,2015.

3. Bernard Golden ,Amazon Web Services For Dummies, John Wiley & Sons, First Edition,2013.

4. Shahed Latif, Subra Kumaraswamy, Tim Mather , Cloud Security and Privacy, O'Reilly Media, Inc. September 2009.

WEB RESOURCE(S):

1. nptel.ac.in

COURSE OUTCOMES:

CO502.1 Understand the basic concepts of cloud computing, the advantages and disadvantages of the cloud paradigm and compare the cloud service models.

CO502.2 Explain the concept of Virtualization and illustrate the design of a data center and discuss about IT service management.

CO502.3 Identify the various forms of virtualization techniques that can be applied to multiple layers within a data center.

CO502.4 Illustrate the cloud security mechanisms that can be applied to combat the various cloud security threats.

CO502.5 Illustrate the capabilities of cloud computing framework like Amazon EC3, Azure Cloud, Aneka framework, Google AppEngine.

PO vs CO Mapping

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO502.1	3											3
CO502.2	3	3	3					3				3
CO502.3	3	3	3	3	3							
CO502.4	3	3	3	3	3			3				3
CO502.5	3				3				3		3	3

19IT5611   VIRTUALIZATION & CLOUD COMPUTING LABORATORY

L T P C
0 0 4 2

OBJECTIVES:

1. To create a virtual environment.

PRE-REQUISITE:

 Fundamental knowledge in networking, hardware, Operating System.

List of Experiments

- Create virtual machine with different flavors of linux or windows OS on top of windows7 or 8.
- Find a procedure to transfer the files from one virtual machine to another virtual machine.
- Install a C compiler in the virtual machine and execute a sample program.
- Install Google App Engine. Create *hello world* app and other simple web applications using python/java.
- Find a procedure to create a private cloud.
- Find procedure to install storage controller and interact with it.
- Find a procedure create a one node cluster.
- Write a word count program to demonstrate the use of Map and Reduce tasks

COURSE OUTCOMES:

CO507.1 Installation of various virtualization tools such as Virtual box, VMware workstation.

CO507.2 Install and use a generic cloud environment that can be used as a private cloud.

CO507.3 Manipulate large data sets in a parallel environment.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO507.1	3				3							3
CO507.2							3	3			3	
CO507.3	3	3	3	3	3	3		3			3	3

TOTAL HOURS: 45

19IT5M01	INDIAN CONSTITUTION	L T P C
		1 0 0 0

OBJECTIVES:

The course will enable students to:

1. To learn basic information about Indian constitution.
2. To learn Union executive and state executive.
3. To understand election, amendments and emergency provisions.
4. To understand constitutional provisions/ local administration
5. To learn the Human Rights

PRE-REQUISITE: NIL

UNIT I   INTRODUCTION AND BASIC INFORMATION ABOUT INDIAN CONSTITUTION   2

The Necessity of the Constitution, The Societies before and after the Constitution adoption - Introduction to the Indian constitution, The making of the Constitution, The Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India. Fundamental Rights and its Restriction and limitations in different Complex Situations

UNIT II   UNION EXECUTIVE AND STATE EXECUTIVE   3

Parliamentary System, Federal System, Centre-State Relations - Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism - State Executives – Governor , Chief Minister, State Cabinet, State Legislature, High Court and Subordinate Courts,

UNIT III   ELECTIONS, AMENDMENTS AND EMERGENCY PROVISIONS   3

Elections, Electoral Process, and Election Commission of India, Election Laws - Amendments - Methods in Constitutional Amendments (How and Why) and Important Constitutional Amendments.

UNIT IV   CONSTITUTIONAL PROVISIONS/ LOCAL ADMINISTRATION   2

Special Constitutional Provisions for SC & ST, OBC, Special Provision for Women, Children & Backward Classes - Local Administration : Powers and functions of Municipalities and Panchyats System. Co – Operative Societies and Constitutional and Non-constitutional Bodies.

UNIT V   HUMAN RIGHTS   2

Human Rights/values – Meaning and Definitions, Legislative Specific Themes in Human Rights and Functions/ Roles of National Human Rights Commission of India.

Total: 12 Periods

TEXT BOOKS(S):

1. J.N.Pandey -Constitutional Law Of India In English 51th Edition , Central Law Agency,Allahabad.
2. Durga Das Basu, - Introduction to the Constitution of India,LexisNexis publisher

REFERENCE(S):

1. M.P. Jain,Indian Constitutional Law, LexisNexis publisher

COURSE OUTCOMES:

At the end of the course, the students will be able to:

C0508.1   Familiar with basic information about Indian constitution

CO508.2   Identify Union executive and state executive.

CO508.3   Know about election, amendments and emergency provisions.

CO508.4   Have Knowledge about constitutional provisions/ local administration.

CO508.5   Follow Human Rights.

PO vs CO MAPPING:

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C0508.1						3		3				3
CO508.2						3		3				3
CO508.3						3		3				3
CO508.4						3		3				3
CO508.5						3		3				3

19IT5AP3   APTITUDE – III   **L T P C**

                                                                          2 0 0 0

OBJECTIVES:

1. To enhance the problem solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of competitive examinations.

PRE-REQUISITE:

⎕   Mathematical Knowledge.

UNIT I   **5**

Time and Work, Pipes and Cisterns, Chain Rule

UNIT II: **5**

Boats and Streams, Partnership, Stock and shares

UNIT III: **5**

Progression, Logarithms, Banker's discount

                                                                   TOTAL HOURS: 15

REFERENCE(S):

1. Quantitative Aptitude by Dr.R.S.Agarwal

WEB REFERENCE(S):

2. https://www.edutechlearners.com/quantitative-aptitude-by-r-s-aggarwal-pdf/

3. http://www.visionias.net/2016/12/rs-aggarwal-quantitative-aptitude-free.html

COURSE OUTCOMES:

CO509.1   Solve the problems based on time, pipes and chain rule

CO509.2   Solve the problems based on boat and streams, partnership, stocks and shares

CO510.3   Apply and solve problems based on progression, logarithms, banker"s discount.

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
VI SEMESTER

Code No.	Course	Category	L	T	P	C	H
SIXTH SEMESTER							
19IT6601	Data Mining and Predictive Analytics	PC	3	0	2	4	5
19IT6602	IoT Protocols and Architecture	PC	3	0	0	3	3
19IT6603	Network and Information Security	PC	3	0	0	3	3
	Professional Elective – III	PE	3	0	0	3	3
	Professional Elective – IV	PE	3	0	0	3	3
	Open Elective – III	OE	3	0	0	3	3
19IT6611	IoT and Security Laboratory	PC	0	0	4	2	4
19IT6901	Engineering Clinics - Mini Project	EEC	0	0	2	1	2
19IT6902	Internship	EEC	-	-	-	2	-
19IT6M01	Professional Communication – Advanced Reading and Writing	HSS	2	0	0	-	2
	TOTAL		**20**	**0**	**8**	**24**	**28**

19IT6601   DATA MINING AND PREDICTIVE ANALYTICS   L T P C

2 0 2 4

OBJECTIVE(S):
- To know the fundamental concepts of Big Data, Data Analytics and Machine learning.
- Be acquainted with tools and techniques for Knowledge discovery process.
- To learn application of intelligent techniques for decision making.

PRE-REQUISITE(S):
1. 19IT4601 - Data Base Systems,19IT4611 - Data Base Systems Laboratory

UNIT I   DATA MINING   6

Overview - Data Mining Functionalities, Classification of Data Mining Systems, Data Mining Task Primitives, Data Preprocessing, Statistical distribution, Data Cleaning, Integration and Transformation, Data Reduction, Discretization and concept Hierarchy.

UNIT II   ASSOCIATION AND CORRELATION ANALYSIS   6

Basic concepts, Market-Basket Analysis, Frequent Item set Mining Methods, Efficient and scalable frequent item set mining methods, Apriori approach-Improving Efficiency, Association rule mining without candidate item set generation, Mining Various Kinds of Association Rules - Correlation Analysis - From association rules to correlation analysis.

UNIT III   CLASSIFICATION AND PREDICTION   6

Classification and Prediction: Introduction, Classification by Decision Tree Induction, Attribute selection measures, Bayesian classification, Rule based classification, Classification by back propagation, Prediction - Linear regression, Accuracy and Error measures, Classifier accuracy measures, Predictor error measures.

UNIT IV   DATA ANALYTICS   6

Big Data Analytics overview - Characteristics - Data Analytics life cycle - Data discovery - Data Preparation -Model Planning - Model Building - Communicating Results - Operationalizing - Case Studies - Data Analytics using R.

UNIT V   ADVANCED ANALYTICAL MODELLING   6

Cluster Analysis : Types of data in cluster analysis, Categorization of major clustering methods, Partitioning Methods - K means, K- Medoids clustering, Hierarchical Methods - Agglomerative and Divisive clustering, Balanced Iterative Reducing and clustering using hierarchies, ROCK- Clustering algorithm for categorical attributes, Outlier Analysis

HOURS: 30

LIST OF EXPERIMENTS   **30 Hours**

1. Data Preparation and analysis using WEKA
2. Implementation of Apriori algorithm using WEKA
3. Implementation of FP Growth algorithm using WEKA
4. Implementation of Hierarchical clustering using WEKA
5. Classification based Predictive Analysis using WEKA
6. Predictive Analytics using Linear Regression
7. Data Visualization
8. Data Manipulation in R
9. Statistical Analysis using R
10. Case study on Real time data modeling and analysis

TOTAL HOURS: 30 + 30

TEXT BOOK(S):

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Elsevier - Morgan Kaufmann Publisher, Second Edition, 2012.

2. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.

REFERENCE BOOK(S):

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

2. Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.

3. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.

4. Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with Map Reduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010.

WEB REFERENCE(S):
1. https://www.tutorialspoint.com/r/index.htm
2. https://www.tutorialspoint.com/weka/index.htm
3. https://docs.python.org/3/tutorial/

COURSE OUTCOME(S):

CO601. 1 Work with big data tools and its analysis techniques.

CO601. 2 Learn and apply different mining algorithms and recommendation systems for large volumes of data.

CO601. 3 Understand knowledge discovery process and methodologies

CO601. 4 Analyze data by utilizing clustering, association and classification algorithms.

CO601. 5 Build a predictive analytic solution.

PO VS CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO601. 1	3				3		3					3
CO601. 2	3	3	3	3	3							3
CO601. 3	3											
CO601. 4	3	3	3	3	3							
CO601. 5	3	3	3				3					3

1Low 2Medium 3High

19IT6602   IoT PROTOCOLS AND ARCHITECTURE   L T P C
3 0 0 3

OBJECTIVES:

1. To understand the fundamentals of Internet of Things
2. To learn about the basics of IOT protocols
3. To build a small lowcost embedded system using Raspberry Pi.
4. To apply the concept of Internet of Things in the real world scenario.

PRE-REQUISITE:

19IT4603 -Microprocessor and Microcontrollers,19IT5602-Virtualization and Cloud Computing

UNIT I   INTRODUCTION TO IOT   9

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology

UNIT II   IOT ARCHITECTURE   9

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNIT III   IOT PROTOCOLS   9

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP – Security

UNIT IV   BUILDING IOT WITH RASPBERRY PI & ARDUINO   9

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

UNIT V   CASE STUDIES AND REAL-WORLD APPLICATIONS   9

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs – Cloudfor IoT - Amazon Web Services for IoT.

TOTAL HOURS: 45

TEXT BOOKS(S):

1. ArshdeepBahga, Vijay Madisetti, ―Internet of Things – A hands-on approach‖, Universities Press, 2015

2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―Architecting the Internet of Things‖, Springer, 2011.

REFERENCE(S):

1. Honbo Zhou, ―The Internet of Things in the Cloud: A Middleware Perspective‖, CRC Press, 2012.

2. Jan Ho ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.

3. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols‖, Wiley, 2012

COURSE OUTCOME(S):

CO602. 1   Analyze various protocols for IoT

CO602. 2   Develop web services to access/control IoT devices.

CO602. 3   Understand the concept of IoT protocols.

CO602. 4   Analyze the real time applications of IoT using Raspberry Pi.

CO602. 5   Deploy an IoT application and connect to the cloud.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO602. 1	2	3										2
CO602. 2	1	2			2				2	3		3
CO602. 3	1	2			2				2	3		
CO602. 4	2	2										3
CO602. 5	2	2										3

1Low 2Medium 3High

19IT6603	**NETWORK AND INFORMATION SECURITY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVE(S):

1. Combine the various security methods for designing a trusted secure network

2. List the different kinds of security issues.

3. Classify the various security algorithms and their features

PRE-REQUISITE(S):

1. 19IT3201 - Probability & Statistics

2. 19IT4602 -Data Communication and Computer Networks

UNIT I   INTRODUCTION TO CRYPTOGRAPHY AND SYMMETRIC KEY CIPHERS   9

Computer Security Concepts - OSI Security Architecture -Security Attacks - Services, Mechanisms -Symmetric Cipher Model - Traditional Block Cipher Structure - The Data Encryption Standard -The Strength of DES - Advanced Encryption Standard.

UNIT II   PUBLIC KEY CRYPTOGRAPHY   9

Principles of public key cryptosystems-RSA algorithm - Diffie- Hellman Key Exchange-ElGamal Cryptosystem- Elliptic Curve Cryptography

UNIT III   CRYPTOGRAPHIC DATA INTEGRITY ALGORITHMS   9

Applications of cryptographic hash functions-requirements and security-Secure Hash Algorithm -SHA3-Message authentication requirements, functions & codes-HMAC-digital signatures- NIST-Digital signature Algorithm (DSA) - Block Chain– Architecture – Hashing - version & variations – Use cases - Limitations.

UNIT IV   WEB SECURITY AND EMAIL SECURITY   9

Web security issues-Secure Socket Layer-Transport Layer Security-pretty good privacy (PGP)-S/MIME

UNIT V   IP AND SYSTEM SECURITY   9

 IP security overview-IP security policy-Encapsulating Security payload-intruders-intrusion detection-virus/worms-countermeasure-need for firewalls-firewall characteristics-types of firewalls

TOTAL HOURS: 45

TEXT BOOK(S):

1. William Stallings, "Cryptography and network security: Principles and practices", 7th Edition, ISBN-13: 978-9332585225, Pearson Education, 2017.
2. Behrouz A. Forouzan, Debdeep Mukhopadhyay, "Cryptography and network security", 3rd Edition, ISBN-13: 978-9339220945, McGraw Hill Education, 2013.

REFERENCE BOOK(S):

1. William Stallings, "Network Security Essentials: Applications and Standards", ISBN-13: 978-9352866601, 6th edition, Pearson Education, 2018.
2. Atul Kahate, "Cryptography and Network Security", 3rd Edition, McGraw Hill Education, ISBN-13: 978-1259029882, 2013.

3. Wenbo Mao, "Modern Cryptography", First Edition, Pearson Education, 2008 ISBN-13: 978-0132887410, 2008.

4. Roberta Bragg, Mark Rhodes, Keith Strassberg, "Network Security: The Complete Reference", Tata McGraw Hill Edition, 2008. ISBN-13: 978-0070586710, 2008.

5. Charlie Kaufmsan, Radia Perlman, Mike Speciner, "Network Security: Private Communication in a Public World", Second Edition, Pearson Education, 2016, ISBN-13: 978-0130460196, 2016.

WEB REFERENCE(S):

1. https://blockgeeks.com/guides/what-is-blockchain-technology/
2. https://www.guru99.com/blockchain-tutorial.html

COURSE OUTCOME(S):

CO603. 1   Explain the theory of fundamental cryptography, encryption, and decryption algorithms

CO603. 2   Apply cryptographic algorithms and Hash algorithms to ensure data secrecy.

CO603. 3   Apply the concepts of data integrity algorithms.

CO603. 4   Understand the importance of network security issues.

CO603. 5   Explain the different types of virus/worms & firewalls.

PO VS CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO603. 1	3	2	3									
CO603. 2	3	2	3		3							
CO603. 3	3	3	3	3	2							1
CO603. 4	3	2		1								1
CO603. 5	3				2	2	3	3				1

1Low 2Medium 3High

19IT6901 IOT AND SECURITY LABORATORY   **L T P C**

                                                             0 0 2 1

OBJECTIVES:

The course will enable students to:

   The student should be made to:

1. To enable the students to design and build simple systems with arduino /Raspberry pi microcontrollers and sensors.
2. To experiment on IoT platforms and develop a system on it.
3. Be exposed to the different cipher techniques & Learn to implement the algorithms DES, RSA,MD5,SHA-1
4. Learn to use tools like GnuPG, KF sensor, Net Strumbler

List of Experiments:

IoT Lab:

1. Introduction to Arduino, working with LED & LCD
2. Interfacing Single Sensors with Arduino
3. Interfacing Multiple Sensors with Arduino
4. Introduction to Node MCU Sensor Interface
5. Interfacing sensors with Node MCU
6. Study and Implement RFID, NFC using Arduino.
7. Study and implement MQTT protocol using Arduino.
8. Study and Configure Raspberry Pi - WAP for LED blink using Raspberry Pi.
9. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.
10. Introduction to Think Speak Server - Implementation of Think Speak Server
11. Home Automation Projects using IoT
12. Google Assistant based Home Automation using IFTTT

Security Lab:

1. Implement the SUBSTITUTION & TRANSPOSITION TECHNIQUES
2. Implement the following algorithms
   o DES , RSA Algorithm, Diffiee-Hellman ,MD5, SHA-1
3. Implement the SIGNATURE SCHEME – Digital Signature Standard
4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5. Setup a honey pot and monitor the honeypot on network (KF Sensor)
6. Installation of rootkits and study about the variety of options

7. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)

8. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

9. Demonstrations of any Web application and Cyber security tool.

COURSE OUTCOMES

After successful completion of this course, the students should be able to: CO607.1:

Implement Cipner techniques and develop security algorithms CO607.2:

Use different open source tools for network security and analysis. CO607.3:

Develop a system using a microcontroller

CO607.4: Implement a system in IoT platforms.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO607. 1	3				3		3					3
CO607. 2	3	3	3	3	3							3
CO607. 3	3											
CO607. 4	3	3	3	3	3							

1Low 2Medium 3High

19IT6901 ENGINEERING CLINICS – MINI PROJECT   **L T P C**
0 0 2 1

OBJECTIVES:

The course will enable students to:

1. To learn the basic and important design concepts and issues of development of mobile applications.

2. To develop a miniproject in app development.

3. To help the students look into the functioning of simple to complex devices and systems

4. To enable the students to design and build simple systems on their own

5. To help experiment with innovative ideas in design and team work

6. To create an engaging and challenging environment in the engineering lab

PRE-REQUISITES: Java Programming.

1. Study of Andoid architecture – Features –components -Study of UI design in Android – Layout - Views

2. Develop an application that uses GUI components, Font and Colours

3. Develop an application that uses Layout Managers and event listeners.

4. Write an application that draws basic graphical primitives on the screen.

5. Study of Data persistence and DB connectivity

6. Implement an application that uses Multi-threading

7. Develop a native application that uses GPS location information

8. Implement an application that writes data to the SD card.

9. Implement an application that creates an alert upon receiving a message

10. Develop a mobile application to send an emai

COURSE OUTCOMES

After successful completion of this course, the students should be able to:

CO608.1: Identify a practical problems and find a solution

CO608.2: Understand the project management techniques

CO608.3: Demonstrate their technical report writing and presentation skills

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO608. 1	3	3						3		3		3
CO608. 2	3	3	3									3
CO608. 3	3	3				3	3					3

1Low 2Medium 3High

TOTAL HOURS: 30

Guidelines for Mini Project

Mini Project consists of three phases,

In the first phase, Students should submit the Abstract of the Project. Abstract includes, finalized topic and its scope and Tool to be used.

In the second phase, students must submit design level thesis preferably UML diagram along with the timeline for Implementation.

In the third phase, Students must demonstrate the implemented project with a Report.

At the end of each phase, a Review must be conducted.

1. Practical based learning carrying credits.

2. Multi-disciplinary/ Multi-focus group of 5-6 students.

3. Groups can select to work on a specific tasks, or projects related to real world problems.

4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.

5. The students have to present the application in the „Engineering Clinics Expo" at the end of semester.

6. The progress of the course is evaluated based on reviews and final demonstration of prototype / Application

Assessment guidelines for Mini Project.

Reviewers: Panel of 3 Faculty members

Review 1: The Panel members may review the batch and analyze the scope of the project and, evaluate it for 20 Marks.

Review 2: The Panel members may validate the concepts at design level and evaluate it for 30 marks.

Review 3: The Panel members may review the entire demonstration and the Report. It may be evaluated for 50 marks. (Implementation: 30 Marks, Report: 20 Marks).

Report Format: This may be finalized by the HoD.

Final Gradings: It will be provided as total of Review1, 2 and 3 Marks.

19IT6M01 PROFESSIONAL COMMUNICATION – ADVANCED READING AND WRITING   **L T P C**

                                                                                                0 0 2 0

OBJECTIVES:

1. Strengthen Reading skills.
2. Identify prewriting skills.
3. Enhance writing skills with specific reference to Technical Writing.
4. Improve Critical Thinking.
5. Write project proposals with ease.

PRE-REQUISITE:

⬜ The pre-requisite knowledge required by the Students to study this Course is the fundamental knowledge in English Language.

UNIT I   ADVANCED READING   6

Strategies of effective Reading – Newspaper Reading – Reading Abstracts - Uses of glosses and footnotes – Introduction to various types of Magazines/Journals - Reading short Technical Paragraphs – Reading Technical Articles.

UNIT II   READING TO COMPREHEND   6

Read for details – Read to state Reasons – Read to write Opinion statements – Speed reading Techniques – Read analytical paragraphs.

UNIT III   WRITING STRATEGIES   6

Introduction to Writing Strategies – Different genres of writing – Organizing ideas from Journal writings – Note- Making.

UNIT IV   ADVANCED WRITING   6

Writing Abstracts – Writing Literature Survey – Organization of Ideas – Writing Proposals.

UNIT V   PROOF READING   6

Punctuation – Checking for redundancy – Subject-verb agreement – Reading out aloud – Checking for spelling errors – Common errors in English.

TOTAL HOURS: 30

TEXT BOOK(S):

1. Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011.

2. Debra Daise, Charl Norloff, and Paul Carne Reading and Writing (Level 4) Oxford University Press: Oxford, 2011.

REFERENCE(S):

1. Davis, Jason and Rhonda LIss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006.

2. Suresh Kumar.E and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012.

3. Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills. Cambridge University Press: Cambridge, 2004.

4. Goatly, Andrew. Critical Reading and Writing. Routledge: United States of America, 2000.

5. Petelin, Roslyn and Marsh Durham. The Professional Writing Guide: Knowing Well and Knowing Why. Business & Professional Publishing: Australia, 2004.

WEB RESOURCE(S):
1. Google news https://news.google.com
2. Speed Reading https://www.youtube.com/watch?v=y7ghLmcMsMY
3. Writing Strategies https://www.youtube.com/watch?v=8j27mMyGWfM
4. Business Proposal https://www.youtube.com/watch?v=mozVzcNZMG0
5. Proof Reading https://www.youtube.com/watch?v=XuNjIR0a3kc

COURSE OUTCOMES:

CO609. 1   Read and comprehend different genres of writing.

CO609. 2   Write reflectively about course readings.

CO609. 3   Develop unified, specific support in body paragraphs, reviewing paragraph structure as necessary.

CO609. 4   Incorporate source material, showing understanding of plagiarism by paraphrasing, quoting, and citing appropriately.

CO609. 5   Edit, proofread and apply strategies to improve accuracy in grammar, sentence structure, and word choice to a specified level of accuracy.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO609. 1				2			3		3	3	2	2
CO609. 2				2			3		2	3	3	2
CO609. 3				1			1		1	3	3	1
CO609. 4				2			2		2	2	3	3
CO609. 5				3			3		3	3	3	3

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
VII SEMESTER

SEVENTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19IT7101	Professional Ethics for IT Engineers	HSS	3	0	0	3	3
19IT7601	Machine Learning	PC	3	0	0	3	3
	Professional Elective – V	PE	3	0	0	3	3
	Professional Elective – VI	PE	3	0	0	3	3
	Open Elective – IV	OE	3	0	0	3	3
19IT7611	Machine Learning Laboratory	PC	0	0	4	2	4
19IT7M01	Corporate Social Responsibility	HSS	2	0	0	-	2
		TOTAL	**15**	**0**	**4**	**17**	**19**

19IT7101   PROFESSIONAL ETHICS FOR IT ENGINEERS   L T P C

3 0 0 3

OBJECTIVE:

1. To enable the students to imbibe and internalize the Values and Ethical Behaviour in the personal and Professional lives.

PREREQUISITE: NIL

UNIT I   INTRODUCTION TO PROFESSIONAL ETHICS   8

Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT II   BASIC THEORIES   8

Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT III   PROFESSIONAL PRACTICES IN ENGINEERING   8

Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; The Darvaza gas crater

UNIT IV   COMPUTER CRIME AND ONLINE SOCIAL NETWORKING   11

Introduction to computer Crime - IT Security Incidents - Implementing Trustworthy Computing - Business Applications of Online Social Networking - Social Networking Ethical Issues - Online Virtual Worlds Intellectual Property: Copyrights, Patents, Trade mark, Key Intellectual Property Issues

UNIT V   ETHICS FOR IT ORGANIZATION, IT WORKERS AND IT USERS   10

Key Ethical Issues for Organizations – Contingent Workers – Outsourcing – Whistle-Blowing – ICT Industry Code of Conduct. Ethics for IT Workers and IT Users: IT Professionals and IT users

TOTAL HOURS: 45

TEXT BOOK(S):

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. George W. Reynolds Strayer University, "Ethics in Information Technology", Cengage Learning, 2019

REFERENCE(S):

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage learning, 2015.

WEB RESOURCE(S):

1. https://en.wikipedia.org/wiki/Darvaza_gas_crater

COURSE OUTCOMES:

CO701. 1 Understand the importance of Values and Ethics in their personal lives and professional careers.

CO701. 2 Understand the basic ethical theories and moral developments

CO701. 3 Learn to apply the engineering concepts technology as per the professional conduct and understand the role of responsible engineers.

CO701. 4 The students will learn about Computer crime, Online Social Networking and Intellectual Property.

CO701. 5 Understand the ethics for IT workers, users and IT organization.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO701. 1						3	3	3	3			3
CO701. 2						3	3	3	3			3
CO701. 3						3	3	3	3			3
CO701. 4	3				2	3	3	3	3			2
CO701. 5	3				2	3	3	3	3			2

1Low 2Medium 3High

19IT7601   MACHINE LEARNING   **L T P C**
                                                             3 0 0 3

OBJECTIVES:

1. To understand the need for machine learning for various problem solving

2. To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning

3. To understand the latest trends in machine learning

4. To design appropriate machine learning algorithms for problem solving.

PRE-REQUISITE: DATA ANALYTICS

UNIT I   INTRODUCTION   9

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search

UNIT II   NEURAL NETWORKS AND GENETIC ALGORITHMS   9

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III   BAYESIAN AND COMPUTATIONAL LEARNING   9

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV   INSTANT BASED LEARNING   9

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

UNIT V   ADVANCED LEARNING   9

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

COURSE OUTCOMES:

CO702. 1   After Successful completion of this course, the students will be able to:

CO702. 2   Differentiate between supervised, unsupervised, semi-supervised machine

learning approaches

CO702. 3   Discuss the decision tree algorithm and identity and overcome the problem of overfitting Discuss and apply the back-propagation algorithm and genetic algorithms to various problems

CO702. 4   Apply the Bayesian concepts to machine learning

CO702. 5   Analyse and suggest appropriate machine learning approaches for various types of problems

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO702. 1	3	3										
CO702. 2	3	3										
CO702. 3	2	2	2									
CO702. 4	2	2	2									
CO702. 5	2	2	2	2	2				2			2

1Low 2Medium 3High

19IT7611   MACHINE LEARNING LABORATORY   L T P C
                                                    3 0 0 3

OBJECTIVES:

1. Make use of Data sets in implementing the machine learning algorithms
2. Implement the machine learning concepts and algorithms in any suitable language of choice

List of Experiments

1. Implement and demonstratethe FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithmto output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge toclassify a new sample.

4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.

5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct aBayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric Locally Weighted Regressionalgorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

COURSE OUTCOMES:

C703-1.1	Understand the implementation procedures for the machine learning algorithms.
C703-1.2	Design Java/Python programs for various Learning algorithms.
C703-1.3	Apply appropriate data sets to the Machine Learning algorithms.
C703-1.4	Identify and apply Machine Learning algorithms to solve real world problems.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C703-1.1	3	3	3									3
C703-1.2		3	3	3								3
C703-1.3		3	3	3		3						3
C703-1.4		3	3	3								3
C703-1.5	3	3	3									3

1Low 2Medium 3High

19IT7M01   **CORPORATE SOCIAL RESPONSIBILITY**   **L T P C**

                                                                 3 0 0 3

OBJECTIVES:

1. To impart the introduction about CSR and its concepts.

2. To learn about CSR implementation and the drivers.

3. To have an insight about current trends of CSR.

4. To make students understand the concept, theories and application of CSR for the Development of the Society.

Unit I   Introduction to CSR   9

Meaning and Definition, History of CSR, Concepts of Charity, Corporate philanthropy, Corporate Citizenship, Sustainability and Stakeholder Management. Environmental aspect of CSR Chronological evolution and Models of CSR in India Carroll's model Major codes on CSR Initiatives in India.

Unit II   International framework for Corporate Social Responsibility   9

Millennium Development Goals, Sustainable Development Goals, Relationship between CSR and MDGs. United Nations (UN) Global Compact 2011. UN guiding principles on business and human rights. OECD CSR policy tool, ILO tri-partite declaration of principles on multinational enterprises and social policy.

Unit III   CSR-Legislation in India and the World   9

Section 135 of Companies Act 2013.Scope for CSR Activities under Schedule VII, Appointment of Independent Directors on the Board, and Computation of Net Profit's Implementing Process in India.

Unit IV   The Drivers of CSR in India   9

Market based pressure and incentives, civil society pressure, the regulatory environment in India Counter trends, Review of current trends and opportunities in CSR, Review of successful corporate initiatives and challenges of CSR. Case Studies of Major CSR Initiatives

Unit V   Identifying key stakeholders of CSR   9

Role of Public Sector in Corporate, government programs, Nonprofit and Local Self Governance in implementing CSR, Global Compact Self-Assessment Tool, National Voluntary Guidelines by Govt. of India, Roles and responsibilities of corporate foundations.

TOTAL HOURS : 45

REFERENCE(S):

1. Mark S. Schwartz - "Corporate Social Responsibility: An Ethical Approach"

2. Wayne Visser and Nick Tolhurst –"The World Guide to CSR"

3. Lelouche, Idowu and Filho, "Innovative CSR"

4. Sanjay K Agarwal ,"Corporate Social Responsibility in India"

5. M. A. Quaddus, "Handbook of Corporate Sustainability: Frameworks, Strategies and Tools".

COURSE OUTCOMES:

1	Understand the key characteristics of Corporate Social Responsibility (CSR) in the context of present-day management
2	Apprise regarding business decision-making which is informed by ethical values and respect for people communities and the environment
3	Become aware of creating a strategic plan that enables an organization to reach out to its internal and external stakeholders with consistent messages
4	Understand critical issues of Corporate Social Responsibility (CSR) in a cross-cultural setting
5	Understand the role of stakeholders in various sectors.

PO vs CO MAPPING

CO No	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO303. 1	3			3		3				3		
CO303. 2		3			3							
CO303. 3			3						3		3	
		3					3			3		3
	3			3				3			3	

1→Low 2→Medium 3→High

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
VIII SEMESTER

EIGHTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
	Professional Elective – VII	PE	3	0	0	3	3
	Professional Elective – VIII	PE	3	0	0	3	3
19IT8911	Project Work	EEC	0	0	4	9	9
	TOTAL		**6**	**0**	**4**	**15**	**15**

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

PROFESSIONAL ELECTIVE – I

V SEMESTER

Code No	Course	L	T	P	C
19IT5701	Advanced Java Programming	3	0	0	3
19IT5702	Distributed Computing	3	0	0	3
19IT5703	Unix System Architecture	3	0	0	3
19IT5704	Discrete mathematics and applications	3	0	0	3
19IT5705	Computer Graphics and Visualizaiton	3	0	0	3

19IT5701   ADVANCED JAVA PROGRAMMING   **L T P C**

3 0 0 3

OBJECTIVES:

- To learn advanced Java programming concepts like interface, threads,Swings etc.
- To develop network programs in Java.
- To understand Concepts needed for distributed and multi-tier applications.
- To understand issues in enterprise applications development.

UNIT I   JAVA FUNDAMENTALS   9

Java I/O streaming – filter and pipe streams – Byte Code interpretation - Threading –Swing.

UNIT II   NETWORK PROGRAMMING IN JAVA   9

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services

UNIT III   APPLICATIONS IN DISTRIBUTED ENVIRONMENT   9

Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models - JAR file creation.

UNIT IV   MULTI-TIER APPLICATION DEVELOPMENT   9

Server side programming – servlets – Java Server Pages - Applet to Applet

communication – applet to Servlet communication - JDBC – Applications on databases – Multimedia streaming applications – Java Media Framework.

UNIT V   ENTERPRISE APPLICATIONS   9

Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Elliotte Rusty Harold, "Java Network Programming", O"Reilly publishers, Fourth Edition, 2013.
2. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc.,Sixth Edition, 2010.
3. Hortsmann& Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, Tenth Edition, 2016.

REFERENCE BOOK(S):

1. Herbert Schildt, "Java: The Complete Reference", Oracle Press, Eleventh Edition, 2019.

WEB REFERENCE(S):   http://java.sun.com.

COURSE OUTCOME(S):

At the end of the course the students will be able to,

C503-1.1   Work with Streams and File Input/Output

C503-1.2   Work with distributed environment.

C503-1.3   Demonstrate uses the sockets and datagrams.

C503-1.4   Expose themselves to advanced topics servlets, applets, JSP and JDBC database connectivity, multimedia streaming and framework.

C503-1.5   Discuss aboutJ2EE, Java beans.

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C503-1.1	3	2	3		3			1				2
C503-1.2	3	2	3		3			1				2
C503-1.3	3	2	3		3			1				
C503-1.4	3	2	3		3			1				2
C503-1.5	3	2	3		3			1				

1Low 2Medium 3High

19IT5702   DISTRIBUTED COMPUTING   **L T P C**

                                                              3 0 0 3

OBJECTIVE(S):

- Understand foundations of Distributed Systems
- Introduce the idea of peer to peer services and file system
- Understand in detail the system level and support required for distributed system
- Understand the issues involved in studying process and resource management

UNIT I   INTRODUCTION   7

Introduction – Examples of Distributed Systems–Trends in Distributed Systems – Focus on resource sharing – Challenges. Case study: World Wide Web.

UNIT II   COMMUNICATION IN DISTRIBUTED SYSTEM   10

System Model – Inter process Communication – the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI Remote Method Invocation and Objects: Remote Invocation – Introduction – Request-reply protocols – Remote procedure call – Remote method invocation. Case study: Java RMI

UNIT III   PEER TO PEER SERVICES AND FILE SYSTEM   10

Peer-to-peer Systems – Introduction – Napster and its legacy – Peer-to-peer – Middleware – Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems: Introduction – File service architecture – Andrew File system.

UNIT IV   SYNCHRONIZATION AND REPLICATION   9

Introduction – Clocks, events and process states – Synchronizing physical clocks- Logical time and logical clocks – Global states – Coordination and Agreement – Introduction – Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions

UNIT V   PROCESS & RESOURCE MANAGEMENT   9

ProcessManagement: Process Migration: Features, Mechanism – Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms – Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

TOTAL HOURS: 45

TEXT BOOK(S):

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education, 2012.

2. Liu M.L., "Distributed Computing, Principles and Applications", Pearson Education, 2004.

REFERENCE BOOK(S):

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.

2. Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.

3. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufman Publishers, USA, 2003.

4. William Stallings, "Parallel and Distributed Processing and applications", ISPA, Springer, 2005.

COURSE OUTCOME(S):

At the end of the course the students will be able to,

C503-2.1   Discuss trends in Distributed Systems.

C503-2.2   Apply remote method invocation and objects and network virtualization.

C503-2.3   Discuss about the peer to peer services and file system.

C503-2.4   Explain about the synchronization and replication

C503-2.5   Design process and resource management systems.

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C503-2.1	3											1
C503-2.2	3	2	3									
C503-2.3	3											2
C503-2.4	3	3	3	3								
C503-2.5	3	2	3		3			1				

1Low 2Medium 3High

19IT5703   UNIX SYSTEM ARCHITECTURE   L T P C
3 0 0 3

OBJECTIVES:

- Get thorough understanding of the kernel.

- Understand the file organization and management.

- Enhance knowledge about various system calls

❑   Have knowledge of process architecture, process control & scheduling and memory management.

UNIT I   INTRODUCTION TO UNIX   9

History, need of change, Standards The process and the kernel: Mode, space and context, Process abstraction, executing in kernel mode, synchronization by blocking interrupts, process scheduling, signals, process creation, termination, awaiting process termination, zombie processes

UNIT II   BUFFER AND INODE   9

The Buffer Cache-Headers-Buffer Pool-Buffer Retrieval-Reading and Writing Disk Blocks – Advantages and Disadvantages. Internal Representation of Files-InodesStructure-Directories-Path Name to Inode- Super Block-Inode Assignment-Allocation of Disk Blocks –Other File Types.

UNIT III   FILE SYSTEM INTERFACE AND FRAMEWORK   9

The user interface to files, File systems, Special files, File system framework, The Vnode/Vfs architecture, Implementation Overview, File System dependent objects, Mounting a file system, Operations on files.

UNIT IV   INTER PROCESS COMMUNICATION   9

Process Tracing – System V IPC – Network Communications – Sockets – Messages – Message Data Structures – Message Passing Interface – Ports – Name Space – Data Structures – Port Translations – Message Passing Process Scheduling and Time: Process scheduling – System calls for Time – Clock – Scheduler goals – Process priorities – Scheduler Implementation – Run Queue Manipulation – The SVR4 Scheduler; Memory Management Policies: Swapping – Demand Paging – A Hybrid System with swapping and demand paging

UNIT V   UNIX TOOLS AND PROGRAMMING   9

Shell programming – UNIX commands – Text processing – sed and awk utilities – grep utility – Introduction to Lex, Yacc utilities – Introduction to Perl programming.

                                                                    TOTAL HOURS: 45

TEXTBOOK(S):

1. Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education, 2002.

REFERENCE BOOK(S):

2. UreshVahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000.

3. John Lion, "Lion"s Commentary on UNIX", 6 th edition, Peer-to-Peer Communications, 2004.

4. Daniel P. Bovet & Marco Cesati, "Understanding the Linux Kernel", O"REILLY, Shroff Publishers &Distributors Pvt. Ltd, 2000.

COURSE OUTCOME(S):

At the end of the course the students will be able to,

C503-3.1   Explain the basic concepts of UNIX Operating System.

C503-3.2   Explain the operational concepts of Buffer, Inode.

C503-3.3   Discuss the various operations of File concepts.

C503-3.4   Describe the various aspects of Process Control.

C503-3.5   Apply various Scheduling techniques for a given situations.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C503-3.1	3											
C503-3.2	3											
C503-3.3	3	1	2									
C503-3.4	3											
C503-3.5	3	3	3	3								3

1Low 2Medium 3High

19IT5704   DISCRETE MATHEMATICS AND APPLICATIONS   L T P C
**   3 0 0 3**

OBJECTIVE(S):

    To extend student"s logical and mathematical maturity and ability to deal with abstraction

    To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems

    To understand the basic concepts of combinatorics and graph theory

☐   To familiarize the applications of algebraic structures

☐   To understand the concepts and significance of lattices and boolean algebra which are widely used in computer science and engineering

UNIT I   LOGICS   9

Propositional logic –Truth table – laws of logic- logical connectives-Tautological implications -logical equivalence - Propositional equivalences-Normal forms-PCNF and PDNF - Predicates and quantifiers — Rules of inference.

UNIT II   COMBINATORICS   9

Mathematical induction – Counting principle-The basics of counting – The pigeonhole principle – Recurrence relations–Solving linear recurrence relations- Generating functions – Inclusion and exclusion principle and its applications.

UNIT III   GRAPHS   9

Graphs- Some basic definitions of graph - graph models – Graph terminology and special types of graphs –Hand shaking theorem- Matrix representation of graphs and graph isomorphism – Connectivity .

UNIT IV   ALGEBRAIC STRUCTURES   9

Algebraic systems – Semi groups and monoids –Sub semigroups and submonoids -Groups – Subgroups –Homomorphism‟s - Normal subgroup and cosets – Lagrange‟s theorem

UNIT V   LATTICES AND BOOLEAN ALGEBRA   9

Relation (Reflexive, antisymmetric and transitive) - Partial ordering – Posets - Hasse diagram- Lattices as posets– Some properties of lattices – Lattices as algebraic systems – Sub lattices -Boolean algebra.

`   **TOTAL HOURS 45**

TEXT BOOK(S):

1. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011

2. Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011

REFERENCE BOOK(S):

1. Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007

2. Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum"s Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

3. Koshy, T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

COURSE OUTCOME(S):

C503-4.1   Have knowledge of the concepts needed to test the logic of a program.

C503-4.2   Have an understanding in identifying structures on many levels.

C503-4.3   Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.

C503-4.4   Be aware of the counting principles

C503-4.5   Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C503-4.1	3	3	3									
C503-4.2	3											
C503-4.3	3	1	3									
C503-4.4	3		3									
C503-4.5	3	3	3									

1Low 2Medium 3High

19IT5705   COMPUTER GRAPHICS AND VISULAIZATION   L T P C

3 0 0 3

OBJECTIVE(S):

 Introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.

 Learn the basic principles of 3- dimensional computer graphics.

 Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.

 Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.

 Discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

 Comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles, and concepts used in computer graphics.

UNIT I   2D PRIMITIVES   9

Graphics System - Output primitives – Line, Circle and Ellipse drawing algorithms – Attributes of output primitives–Two dimensional Geometric transformation-Two dimensional viewing– Line, Polygon, Curve and Text clipping algorithms.

UNIT II   3D CONCEPTS AND BLENDER GRAPHICS   9

Parallel and Perspective projections – Three dimensional object representation– Polygons, Curved lines, Splines, Quadric Surfaces - 3D transformations–Viewing-Visible surface identification. **Blender Graphics:** Blender Interface, Objects- Editing Tools and Materials

UNITIII   GRAPHICS PROGRAMMING   9

Introduction to Illumination models–Flat and Smooth shading -Color Models–RGB, YIQ, CMY, HSV - Graphics programming using OPENGL–Basic graphics primitives– Drawing three dimensional objects & scenes –Adding texture to faces– Adding shadows of objects–Building a camera in a program.

UNIT IV   FRACTALS   9

Fractals and Self similarity–Peano curves–Creating image by iterated functions – Mandelbrot sets– Julia Sets – Random Fractals – Overview of Ray Tracing – Intersecting rays with other primitives–Reflections and Transparency– Boolean operations on Object.

UNIT IV   APPLICATIONS OF COMPUTER GRAPHICS   9

Animations–General Computer Animation, Raster, Key frame-Data Visualization – Business applications – Gaming – Virtual Reality – Augmented Reality.

TOTAL HOURS: 45

TEXTBOOK(S):

1. Donald Hearn, Pauline Baker, "Computer Graphics– C Version", second edition, Pearson Education, 2004.
2. F.S.Hill, "Computer Graphics using OPENGL", Second edition, Pearson Education,2000
3. John M Blain, "The Complete Guide to Blender graphics Computer Modeling and Animation", CRC Press, Fourth Edition,2018.

REFERENCE BOOK(S):

1. James D. Foley, Andries Van Dam, Steven K.Feiner, John F.Hughes, "Computer Graphics - Principles and practice", Second Edition in C, Pearson Education, 2007.

COURSE OUTCOME(S):

- Apply the concepts used in computer graphics and implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- Understand the importance of viewing and projections and Blender Graphics.
- Apply the various color models, animations and implement in Open GL.
- Understand the concept of fractals
- Understand the application of computer graphics in real world applications

PO vs CO Mapping

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C503-4.1	3			3	3	3						2
C503-4.2	3											2
C503-4.3	3	3										2
C503-4.4	3	3		3	3	3						2
C503-4.5	3			3	3	3						2

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

PROFESSIONAL ELECTIVE – II

V SEMESTER

Code No	Course	L	T	P	C
19IT5706	Wireless and Mobile Computing	3	0	0	3
19IT5707	Advanced Data Structures and Algorithms	3	0	0	3
19IT5708	Real Time systems	3	0	0	3
19IT5709	Object Oriented Software Modelling and Design	3	0	0	3
19IT5710	Advanced Database Systems	3	0	0	3

19IT5706   WIRELESS AND MOBILE COMPUTING   L T P C

3 0 0 3

OBJECTIVE(S):

- Understand the basic concepts of mobile computing.
- Be familiar with the network protocol stack.
- Learn the basics of mobile telecommunication system.
- Be exposed to Ad-Hoc networks.
- Gain knowledge about different mobile platforms and application development.

UNIT I   INTRODUCTION   9

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random   Assignment   Schemes   –   Reservation   Based   Schemes.

UNIT II   MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER   9

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT III MOBILE TELECOMMUNICATION SYSTEM 9

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System(UMTS) - LTE – 5G.

UNIT IV MOBILE AD-HOC NETWORKS 9

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT V MOBILE PLATFORMS AND APPLICATIONS 9

Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2012.

REFERENCE BOOK(S):

1. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.

2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.

3. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.

4. William.C.Y.Lee,"Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition,Tata Mc Graw Hill Edition ,2006.

5. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.

WEB REFERENCE(S):

1. Android Developers : http://developer.android.com/index.html

2. Apple Developer : https://developer.apple.com/

3. Windows Phone Dev Center : http://developer.windowsphone.com

4. BlackBerry Developer : http://developer.blackberry.com/

5. https://www.etsi.org/technologies/mobile/4g

6. https://www.qualcomm.com/invention/5g/what-is-5g

COURSE OUTCOME(S):

CO504-1. 1   Understanding the fundamentals of mobile computing and wireless communications.

CO504-1. 2   Apply knowledge of TCP/IP extensions for mobile and wireless networking.

CO504-1. 3   Demonstrate basic skills for cellular networks design.

CO504-1. 4   Analyze the Mobile Ad-hoc networks and various routing protocols.

CO504-1. 5   Analyze the various mobile operating system and its pros and cons

PO vs CO Mapping

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO504-1. 1	3											
CO504-1. 2	3	2	3	3								
CO504-1. 3	3											
CO504-1. 4	3	2	3	3								3
CO504-1. 5	3	2	3	3								3

1Low 2Medium 3High

19IT5707   ADVANCED DATA STRUCTURES AND ALGORITHMS   L T P C

                                                                  3 0 0 3

OBJECTIVE(S):

- Understand and apply various trees and heaps structures.
- Learn different algorithms analysis techniques.
- Apply data structures and algorithms in real time applications
- Able to analyze the efficiency of algorithm.

UNIT I   COMPLEXITY ANALYSIS   9

Asymptotic notations – Properties of big oh notation – asymptotic notation with several parameters – conditional asymptotic notation – amortized analysis – recurrence equations – solving recurrence equations.

UNIT II   HEAP STRUCTURES   9

Min-max heaps – Deaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps.

UNIT III   SEARCH STRUCTURES   9

Binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – splay trees – Tries.

UNIT IV   HASHING AND SETS   9

Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing. Disjoint Set ADT, Dynamic Equivalance Problem, Smart Union Algorithms, Path Compression

UNIT V   ADVANCED ALGORITHM DESIGN AND ANALYSIS   9

Backtracking: Graph coloring – Branch and Bound: Assignment Problem - P & NP problems – NP – complete problems – Approximation algorithms for NP – hard problems – Traveling salesman problem.

TOTAL HOURS: 45

TEXT BOOK(S):

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Galgotia,1999.

2. E. Horowitz, S.Sahni and S. Rajasekaran, Computer Algorithms / C++, Galgotia, 1999.

3. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Asia, 2002.

4. Anany Levitin, ―Introduction to the Design and Analysis of Algorithms‖, Third Edition, Pearson Education, 2012.

REFERENCE BOOK(S):

1. Adam Drozdex, Data Structures and algorithms in C++, Second Edition, Thomson learning – vikas publishing house, 2001.

2. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.

3. Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, "Introduction to Algorithms", Second Edition, PHI 2003.

COURSE OUTCOME(S):

C504-2.1   Analyse the various algorithms.

C504-2.2   Apply the different heap structures to problem solutions and critically analyse the various algorithms.

C504-2.3   Apply the different trees structures to problem solutions and critically analyse the various algorithms.

C504-2.4   Understand the hashing techniques and sets.

C504-2.5   Ability to understand and design algorithms using backtracking and branch and bound. Explain what an approximation algorithm is, and the benefit of using approximation algorithms. Be familiar with some approximation algorithms.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C504-2.1	3	3	3	3								
C504-2.2	3	3	3	3								3
C504-2.3	3	3	3	3								3
C504-2.4	3	3	3	3								3
C504-2.5	3	3	3	3								3

1Low 2Medium 3High

19IT5708   REAL TIME SYSTEMS   L T P C
                                                                        3 0 0 3

OBJECTIVE(S):

- To learn real time operating system concepts, the associated issues & Techniques.
- To understand design and synchronization problems in Real Time System.
- To explore the concepts of real time databases.
- To understand the evaluation techniques present in Real Time System.

UNIT I   INTRODUCTION TO REAL TIME   8

Introduction– Structure of a Real Time System –Task classes – Performance Measures for Real Time Systems – Estimating Program Run Times – Issues in Real Time Computing –

UNIT II   REAL TIME SYSTEM SCHEDULING   7

Task Assignment and Scheduling – Classical uniprocessor scheduling algorithms –Fault Tolerant Scheduling.

UNIT III   INTERTASK COMMUNICATION AND MEMORY MANAGEMENT   12

Buffering data – Time relative Buffering- Ring Buffers – Mailboxes – Queues – Critical regions – Semaphores – other Synchronization mechanisms – deadlock – priority inversion – process stack management – run time ring buffer – maximum stack size – multiple stack arrangement – memory management in task control block - swapping – overlays – Block page management – replacement algorithms – memory locking – working sets – real time garbage collection – contiguous file systems.

UNIT IV   REAL TIME DATABASES   9

Real time Databases – Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two– phase Approach to improve Predictability – Maintaining Serialization Consistency – Databases for Hard Real Time Systems.

UNIT V   EVALUATION TECHNIQUES AND CLOCK SYNCHRONIZATION   9

Reliability Evaluation Techniques – Obtaining parameter values, Reliability models for Hardware Redundancy–Software error models. Clock Synchronization–Clock, A Nonfault–Tolerant Synchronization Algorithm – Impact of faults – Fault Tolerant Synchronization in Hardware – Fault Tolerant Synchronization in software.

TEXT BOOKS

1. Real Time Systems – Jane W. S. Liu, Pearson Education Publication.

REFERENCE BOOKS

1. Real Time Systems – Mall Rajib, Pearson Education.
2. Real-Time Systems: Scheduling, Analysis, and Verification – Albert M. K. Cheng, Wiley.
3. Phillip A. Laplante Seppo J. Ovaska Real-Time Systems Design and Analysis: Tools for the Practitioner, Fourth Edition .

COURSE OUTCOME(S):

C504-3.1   Discuss concepts of real time systems, performance measures and its issues.

C504-3.2   Make use of real time scheduling algorithms to schedule the tasks in the real time environment.

C504-3.3   Understand the inter task communication and memory management.

C504-3.4   Make use of database in real time applications.

C504-3.5   Make use of architectures and behaviour of real time operating systems and apply evaluation techniques in application.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C504-3.1	3	3	3									
C504-3.2	3	3	3	3								
C504-3.3	3											
C504-3.4	3	3	3				3					3
C504-3.5	3	3	3				3					3

1Low 2Medium 3High

19IT5709 OBJECT ORIENTED SOFTWARE MODELLING& DESIGN   L T P C

3 0 0 3

OBJECTIVE(S):

  - To understand the concepts of process, product and project development.

  - To elucidate the knowledge of requirement analysis & to provide the knowledge of software design.

  - To provide the knowledge of software design and testing.

  - To introduce the project management techniques.

  - To learn the basics of OO analysis and design skills

  - To earn the UML design diagrams

UNIT I   INTRODUCTION   8

An Overview of Object Oriented Systems Development - Object Basics – Object Oriented Systems Development Life Cycle.

UNIT II   OBJECT ORIENTED METHODOLOGIES   12

Rum Baugh Methodology - Booch Methodology - Jacobson Methodology - Patterns – Frameworks – Unified Approach – Unified Modeling Language – Use case - class diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity

Diagram.

UNIT III   OBJECT ORIENTED ANALYSIS   9

Identifying use cases - Object Analysis - Classification – Identifying Object relationships - Attributes and Methods.

UNIT IV   OBJECT ORIENTED DESIGN   8

Design axioms - Designing Classes – Access Layer - Object Storage - Object Interoperability.

UNIT V   SOFTWARE QUALITY AND USABILITY   8

Designing Interface Objects – Software Quality Assurance – System Usability - Measuring User Satisfaction

TOTAL HOURS: 45

TEXT BOOK(S):

1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, Fifth Edition, 2015.
2. Martin Fowler, "UML Distilled", Third Edition, PHI/Pearson Education, 2015.

REFERENCE BOOK(S):

1. Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw-Hill, 2003.
2. James Rum Baugh, Ivar Jacobson, Grady Booch "The Unified Modeling Language Reference Manual", Addison Wesley, 1999.
3. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, "UML Toolkit", OMG Press Wiley Publishing Inc., 2004.

COURSE OUTCOME(S):

C504-4.1   Analyze the software development life cycle.

C504-4.2   Apply the Requirement engineering process with emphasis on elicitation analysis and modeling for any given software requirement and identify appropriate design strategies and analyze the requirement specifications for any software system.

C504-4.3   Test and implement the software which is developed for multidisciplinary approaches.

C504-4.4   Understand the basics of Object oriented system development.

C504-4.5   Express software design with UML diagrams

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C504-4.1	3	3	3	3								
C504-4.2	3	3	3	3								
C504-4.3	3	3	3									
C504-4.4	3											
C504-4.5	3	3	3	3	3		3					3

1Low 2Medium 3High

19IT5710   ADVANCED DATA BASE SYSTEMS   **L T P C**

                                                              3 0 0 3

OBJECTIVE(S):

- Be familiar with a commercial relational database system (Oracle) by writing SQL using the system.
- Be familiar with the relational database theory, and be able to write relational algebra expressions for queries.

UNIT I   PARALLEL AND DISTRIBUTED DATABASES   9

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Three Tier Client Server Architecture- Case Studies.

UNIT II   OBJECT AND OBJECT RELATIONAL DATABASES   9

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems : Object Relational features in SQL / Oracle – Case Studies.

UNIT III   XML DATABASES   9

XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining.

UNIT IV   MOBILE DATABASES   7

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes.

UNIT V   INTELLIGENT DATABASES   11

Active databases – Deductive Databases –– Data warehouses – Decision support systems – ETL - Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP- Multimedia Databases– Image Databases – Text/Document Databases- Video Databases – Audio Databases – Multimedia Database Design - NOSQL

TOTAL HOURS: 45

TEXT BOOK(S):

1. Henry F Korth, Abraham Silberschatz and S. Sudharshan, "Database System Concepts", Sixth Edition, McGraw Hill, 2011.

2. Alex Berson and Stephen J.Smith, ―Data Warehousing, Data Mining & OLAP‖, Tata McGraw – Hill Edition, 35th Reprint 2016.

REFERENCE BOOK(S):

1. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

2. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.

COURSE OUTCOME(S):

C504-5.1   Understand the concepts of Parallel and Distributed Databases.

C504-5.2   Apply query evaluation techniques and query optimization techniques.

C504-5.3   Design and develop a XML Databases.

C504-5.4   Design and develop a Mobile Databases.

C504-5.5   Design and develop an Intelligent Databases.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C504-5.1	3					1						
C504-5.2	3	3	3	3		3				u		
C504-5.3	3	3	3	3		3						
C504-5.4	3	3	3	3		3						3
C504-5.5	3	3	3	3		3						3

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

PROFESSIONAL ELECTIVE – III

VI SEMESTER

Code No	Course	L	T	P	C
19IT6701	Embedded Systems Architecture	3	0	0	3
19IT6702	Computational Theory and Compilers	3	0	0	3
19IT6703	Multimedia Systems and Technologies	3	0	0	3
19IT6704	Wireless Adhoc and Sensor Networks	3	0	0	3
19IT6705	C# and .NET	3	0	0	3

19IT6701   EMBEDDED SYSTEMS ARCHITECTURE   **L T P C**

3 0 0 3

OBJECTIVE(S):

1. Building Blocks of Embedded System.
2. Various Embedded Development Strategies.
3. Bus Communication in processors, Input/output interfacing
4. Basics of Real time operating system and example tutorials to discus on one real time operating system.
5. Various processor scheduling algorithms.

PRE-REQUISITE(S):

1. 19IT4603 **-** Microprocessor and Microcontrollers
2. 19IT4604 - Operating Systems
3. Skill Training
4. 19IT6612 - Mobile Application Development

UNIT I   INTRODUCTION TO EMBEDDED SYSTEMS   9

Introduction to Embedded Systems –Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

UNIT II   EMBEDDED NETWORKING   9

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols RS232 standard – RS42 – RS 485 – CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) –need for device drivers.

UNIT III   EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT   9

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model. Tools: Rasberry Pi – Introduction – Linux Basics for Rasberry Pi, Arduino - GPIO Pin Connections - Direct Connection to GPIO Pins - Expansion Boards - Prototyping Boards.

UNIT IV   EMBEDDED SYSTEM DESIGN   9

Introduction to basic concepts of RTOS- Task, process & threads, interrupt Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance.

UNIT V   EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT   9

Case Study of Washing Machine- Automotive Application–Digital camera-Home Security Systems – PDA-Industry Robots.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Peckol, Embedded system Design, John Wiley and Sons, 2010.
2. Lyla B Das, Embedded Systems-An Integrated Approach, Pearson, 2013.
3. Shibu. K.V, Introduction to Embedded Systems, 2e, Mc graw Hill, 2017.
4. Simon Monk, "Programming the Rasberry Pi Getting started with Python" Mc Graw Hill, 2013.
5. Massimo Bansi, "Getting started with arduino", Oreilly, Third edition 2014.

REFERENCE(S):

1. Raj Kamal, Embedded System-Architecture, Programming, Design, Mc Graw Hill, 2013.
2. C.R.Sarma, Embedded Systems Engineering, University Press (India) Pvt. Ltd, 2013.
3. Tammy Noergaard, Embedded Systems Architecture, Elsevier, 2006.

4. Han-Way Huang, Embedded system Design Using C8051, Cengage Learning, 2009.

5. Rajib Mall Real-Time systems Theory and Practice Pearson Education, 2007.

WEB REFERENCE(S):

1. https://www.elprocus.com/embedded-robotics-real-time-robotic-applications-on-embedded-systems/

2. http://www.robogalaxy.com/post/Role-of-Embedded-System-in-Robotics

3. https://ieeexplore.ieee.org/document/5681968

COURSE OUTCOME(S):

C604-1.1   Understand and analyze embedded systems.

C604-1.2   Operate various Embedded Development Strategies

C604-1.3   Study about the bus Communication in processors.

C604-1.4   Acquire knowledge on various processor scheduling algorithms and tools.

C604-1.5   Analyze the components of real time embedded system applications.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C604-1.1	3								1			
C604-1.2			3									
C604-1.3	3	2										
C604-1.4	3	3										
C604-1.5	3	3	3									

1Low 2Medium 3High

19IT6702   COMPUTATIONAL THEORY AND COMPILERS   L T P C
3 0 0 3

OBJECTIVE(S):

1. Understand the concepts of Automata Theory
2. Get well worth in different phases of constructing a compiler
3. Solve problems using Turing machines.
4. Learn about the different techniques involved in Intermediate Code generation.
5. Learn about the different techniques involved in Code Optimization and generation.

PRE-REQUISITE(S):

1. 19IT3601 - Computer Organization and Architecture

UNIT I   INTRODUCTION TO COMPILERS AND FINITE AUTOMATA   9

Compilers and Interpreters - The structure of a Compiler - Phases of a compiler: Lexical analysis, Syntax analysis, Intermediate code generation, Code optimization, Code generation. FINITE AUTOMATA: Chomsky Classification of Grammars - Finite State Systems - Basic definitions - Transition diagrams - Deterministic & Nondeterministic Finite Automata - Finite Automata with €-moves - Finite Automata with Output - Moore & Mealy Machine.

UNIT II   GRAMMARS   AND   PUSH   DOWN   AUTOMATA   9

Context-Free Grammars - Simplification of Context -Free Grammars - Chomsky Normal Form-Derivations and Parse trees. Pushdown Automata: Definitions - Pushdown Automata and Context-Free Languages - Solving problems like 0n, 1n etc.

UNIT III   TURING   MACHINES   9

Introduction - The Turing Machine Model - Simulating Computers using Turing Machines - Well-formedness of parentheses - Addition of unary numbers - Multiplication of unary numbers – Recognition of binary palindromes - Recognition of words of the form 0n , 1n .

UNIT IV PARSING TECHNIQUES & INTERMEDIATE CODE GENERATION   9

Bottom up parsing: Handle, Handle pruning - Operator precedence parsing - Simple precedence parsing- Top down parsing: Recursive descent parsing, Predictive parsers-LR parsers: SLR parser, LALR Parser. Intermediate code - Postfix notation - Parse trees and Syntax trees - Three address codes, Quadruples and Triples - Translation of assignment statement - Boolean expressions - Statements that alter the flow of control - Array references - Symbol tables: Contents, Structure.

UNIT V   CODE OPTIMIZATION AND CODE GENERATION   9

Introduction to Code Optimization The Principle Sources of Optimization -Loop Optimization - The DAG representation of Basic Blocks - Global data flow analysis - Dominators- Reducible flow graphs - Loop invariant computations - Induction variable elimination - Other loop optimizations. CODE GENERATION Object programs - Issues in Code generation - A simple code generator - Register allocation and assignment - Code generation from DAG's - Peephole optimization.

TOTAL HOURS: 45

TEXT BOOK(S):

1. John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages and Computation", Addison Wesley, Pearson Education, Third Edition, Second Impression, 2009.

2. Alfred V.Aho, Monica S.Lam, Ravi Sethi and Jeffrey D.Ullman "Compilers: Principles, Techniques and Tools", Pearson Education,Inc.,Second Edition,2013.

3. Alfred V. Aho and Jeffrey D. Ullman, "Principles of Compiler Design", Narosa Publishing House pvt. ltd., Twentyfifth Reprint 2002.

REFERENCE BOOK(S):

1. John.C.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata McGraw Hill, Seventh reprint, 2010.

2. Mishra K.L.P, Chandrasekaran. N. "Theory of Computer Science: Automata, Languages and Computation", Prentice Hall of India, Third Edition, 2008.

3. Jean Paul Tremblay and Paul G.Sorenson., "Theory and Practice of Compiler Writing", BS Publication, Reprint 2008.

COURSE OUTCOME(S):

C604-2.1   Get knowledge in constructing system models which are the natural extension of Automata that are used to devise design procedures.

C604-2.2   Discuss and deploy specification of languages using grammars.

C604-2.3   Simulate Computers using Turing Machines.

C604-2.4   Cite and Explain with example the analysis aspects of compiler analysis and synthesis Phases.

C604-2.5   Demonstrate their understanding by solving problems.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C604-2.1	3	3										
C604-2.2	3				2							
C604-2.3	3	3			3							
C604-2.4	3	3	2									
C604-2.5	3	3			1							

1Low 2Medium 3High

19IT6703   MULTIMEDIA SYSTEMS AND TECHNOLOGIES   L T P C
                                                                3 0 0 3

OBJECTIVE(S):
1. Understand the types of audio and video.
2. Know about the building blocks needed for audio and video processing.
3. Get well worth in Multimedia Programming.

UNIT I   MULTIMEDIA SYSTEMS   9
Introduction - Definition of multimedia, multimedia, hardware, software applications and software environments – Media Types – Analog and digital video, digital audio, music and animation – Analog & Digital video – Memory storage – Basic tools – Authoring tools.

UNIT II   BUILDING BLOCKS   9
Text – Hyper text – Sound – Sound cards – Standards – Image – Image types – Image compression, RLE, JPEG, MPEG – Fractal and Wavelet Compressions – Image file types – Animation – Capture and Playback techniques.

UNIT III   MULTIMEDIA ENVIRONMENTS   9
The Compact Disc family, CD-interactive, Digital Video Interactive, QuickTime, Multimedia PC and Microsoft Multimedia Extensions.

UNIT IV   MULTIMEDIA PROGRAMMING   9
Framework Overview, Media classes, Transform classes, Format classes and Component classes – Problems related to programming – Composition, Synchronisation, Interaction, Database integration.

UNIT   MULTIMEDIA TOOLS   9
Moving pictures – Techniques realistic image synthesis, Virtual Reality – Full motion digital video – Video capture techniques – multimedia networks – Desktop video conferencing – Future multimedia.

TEXT BOOKS
1. Multimedia Programming Objects, Environments & Framework – Simon J. Gibbs, Dionysios C. Tsischritziz (Addison-Wesley Publishing Co.)
2. Multimedia- Making it work – Tay Van Ghan – Osborne Tata Mcgraw Hill.

REFERENCE BOOKS

1. Authoring Interactive multimedia – Arch C Luther.
2. Optimizing your Multimedia PC – L.J. Skibbe, Susan Lafe Meister – Comdex.
3. Multimedia Bible – Winn L. Rosch, Sams.
4. Multimedia Producers Bible- Ron Goldberg, Comdex.
5. Multimedia Power Tools – Peter Jellam, Random house Electronic Pub.
6. Multimedia Computing – Mathew E. Hodger & Russel M. Sasnett, Addison Wesley.
7. Integrated Multimedia Systems – Palikom, The communication Wall Overview.
8. Learn about the multimedia tools used in our day to day life activities.

COURSE OUTCOME(S):

C604-3.1   List down different multimedia types.

C604-3.2   Explain the different building blocks of multimedia systems

C604-3.3   Illustrate the working principles of multimedia tools

C604-3.4   Elucidate about multimedia environments.

C604-3.5   Integrate Databases with the frameworks.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C604-3.1	3											3
C604-3.2	3	3	3									
C604-3.3	3	3	3	3	3							
C604-3.4	3						3	2				
C604-3.5	3	3	3	3	3			3				3

1Low 2Medium 3High

19IT6707   WIRELESS AD HOC AND SENSOR NETWORKS   L T P C
                                                           3 0 0 3

OBJECTIVE(S):

1. Understand the design issues in ad hoc and sensor networks.

2. Learn the different types of MAC protocols.

3. Be familiar with different types of adhoc routing protocols.

4. Be exposing to the TCP issues in adhoc networks.

5. Learn the architecture and protocols of wireless sensor networks.

PRE-REQUISITE(S):

1. 19IT4602 - Data Communication and Computer Networks

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 802.11.

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.

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 HOURS: 45

TEXT BOOK(S):

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, Sixth Edition 2008.

REFERENCE(S):

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "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.

4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.

5. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

COURSE OUTCOME(S):

C605-2.1   Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks.

C605-2.2   Analyze the protocol design issues of ad hoc and sensor networks.

C605-2.3   Design routing protocols for ad hoc and with respect to some protocol design issues.

C605-2.4   Design MAC protocols for wireless sensor networks.

C605-2.5   Evaluate the QoS related performance measurements of ad hoc and sensor networks.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C605-2.1	3											
C605-2.2	3	2	3									
C605-2.3	3		3	2								
C605-2.4	3		3									
C605-2.5	3		3					3				2

1Low 2Medium 3High

19IT6705   C# AND .NET   **L T P C**

3 0 0 3

OBJECTIVE(S):

1. Understand the foundations of CLR execution
2. Learn the technologies of the .NET framework
3. Know the object oriented aspects of C#
4. Be aware of application development in .NET
5. Learn web based applications on .NET (ASP.NET)

PRE-REQUISITE(S):

1. 19IT1502 -Problem Solving & Python Programming
2. 19IT3604 - Object Oriented Programming

UNIT I   INTRODUCTION TO C#   9

Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

UNIT II   OBJECT ORIENTED ASPECTS OF C#   9

Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

UNIT III   APPLICATION DEVELOPMENT ON .NET   9

Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.

UNIT IV   WEB BASED APPLICATION DEVELOPMENT ON .NET   9

Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

UNIT V   CLR AND .NET FRAMEWORK   9

Assemblies, Versoning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security in .NET.

TEXT BOOKS:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2018.
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2015.

REFERENCES:

1. Andrew Troelsen , "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O"Reilly, 2010.

COURSE OUTCOME(S):

C604-5.1   Explain the major elements of the .NET frame work.

C604-5.2   Analyze the basic structure of a C# application

C604-5.3   Develop programs using C# on .NET

C604-5.4   Design and develop Web based applications on .NET

C604-5.5   Discuss the concept of CLR.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C604-5.1	3			3	3							2
C604-5.2	3	2	3	3	3						3	1
C604-5.3	3			1	3						3	1
C604-5.4	3			3	3						3	1
C604-5.5	3			2	3							1

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

PROFESSIONAL ELECTIVE – IV

VI SEMESTER

Code No	Course	L	T	P	C
19IT6706	Software Quality Management	3	0	0	3
19IT6707	Digital Signal Processing Techniques	3	0	0	3
19IT6708	Human Computer Interaction	3	0	0	3
19IT6709	Bio Informatics	3	0	0	3
19IT6710	Principles of Management	3	0	0	3
19IT6711	Network Management	3	0	0	3

19IT6706   SOFTWARE QUALITY MANAGEMENT   **L T P C**

3 0 0 3

OBJECTIVE(S):

1. Understand the Metrics and measurements involved in Software Quality Management.

2. Learn about Reliability Growth Model through CASE Tools.

3. Understand different international standards of quality.

PRE-REQUISITE(S):

1. 19IT4605 -Software Engineering Methodologies

UNIT I   INTRODUCTION TO SOFTWARE QUALITY   9

Software Quality – Hierarchical models of Boehm and McCall – Quality measurement – Metrics measurement and analysis – Gilb‟s approach – GQM Model.

UNIT II   SOFTWARE QUALITY ASSURANCE   9

Quality tasks – SQA plan – Teams – Characteristics – Implementation – Documentation – Reviews and Audits.

UNIT III   QUALITY CONTROL AND RELIABILITY   9

Tools for Quality – Ishikawa"s basic tools – CASE tools – Defect prevention and removal – Reliability models – Rayleigh model – Reliability growth models for quality assessment.

UNIT IV   QUALITY MANAGEMENT SYSTEM   9

Elements of QMS – Rayleigh model framework – Reliability Growth models for QMS – Complexity metrics and models – Customer satisfaction analysis.

UNIT V   QUALITY STANDARDS   9

Need for standards – ISO 9000 Series – ISO 9000-3 for software development – CMM and CMMI - PCMM - – Six Sigma concepts.

TOTAL HOURS: 45

TEXT BOOKS

1. Allan C. Gillies, "Software Quality: Theory and Management", Thomson Learning, Third edition, 2011.

2. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education, Singapore Pte Ltd., Second Edition, 2003.

REFERENCES

1. Norman E. Fenton and Shari Lawrence Pfleeger, "Software Metrics" Thomson, 2003.

2. Mordechai Ben – Menachem and Garry S.Marliss, "Software Quality", Thomson Asia Pte Ltd, 2003.

3. Mary Beth Chrissis, Mike Konrad and Sandy Shrum, "CMMI", Pearson Education (Singapore) Pte Ltd, 2003.

4. ISO 9000-3 "Notes for the application of the ISO 9001 Standard to software development".

COURSE OUTCOME(S):

C605-1.1   Discuss Quality Metrics and Measurement analytics.

C605-1.2   Implement, document and review Software Quality Assurance.

C605-1.3   Assess Quality through Reliability growth model through CASE tools.

C605-1.4   Design quality Management systems using techniques like CMM, PCMM and Rayleigh Models.

C605-1.5   Elaborate ISO models and six sigma concepts.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C605-1.1	3											
C605-1.2	3		3								3	
C605-1.3					3							
C605-1.4	3	2	3								3	
C605-1.5								3	3			2

1Low 2Medium 3High

19IT6704   DIGITAL SIGNAL PROCESSING TECHNIQUES   L T P C
3 0 0 3

OBJECTIVE(S):

1. Understand the concept of sampling in analog and digital signals.
2. Learn about frequency transformations.
3. Implement IIR and FIR filter design.
4. Rectify the errors in digital filters.

PRE-REQUISITE(S):

1. 19IT2201 - Transforms and Fourier Series, 19IT3501 - Digital Principles and System Design

UNIT I   SIGNALS AND SYSTEMS   9

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution – Correlation.

UNIT II   FREQUENCY TRANSFORMATIONS   9

Introduction to DFT – Properties of DFT – Circular Convolution – Filtering methods based on DFT – FFT Algorithms – Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT – Use and Application of DCT.

UNIT III   IIR FILTER DESIGN   9

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR

filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.

UNIT IV   FIR FILTER DESIGN   9

Structures of FIR – Linear phase FIR filter – Fourier Series – Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency samplingtechniques.

UNIT V   FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS   9

Binary fixed point and floating point number representations – Comparison – Quantization noise – truncation and rounding – quantization noise power- input quantization error- coefficient quantization error – limit cycle oscillations-dead band- Overflow error-signal scaling.

TOTAL HOURS: 45

TEXT BOOK(S):

1. John G. Proakis and Dimitris G.Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Fourth Edition, Pearson Education, Prentice Hall, 2007.

REFERENCE(S):

1. Emmanuel C.Ifeachor, and Barrie.W.Jervis, "Digital Signal Processing", Second Edition, Pearson Education, Prentice Hall, 2002.

2. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Third Edition, Tata Mc Graw Hill, 2007.

3. A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.

4. Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2006.

COURSE OUTCOME(S):

C604-4.1   Sample discrete and continuous signals.

C604-4.2   Apply DFT and FFT techniques.

C604-4.3   Design IIR filters by techniques like Impulse Invariance and Bilinear Transformation.

C604-4.4   Design FIR filters using windowing techniques

C604-4.5   Implement Quantization and noise removal techniques.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C604-4.1	3	3										
C604-4.2	3	3	3									
C604-4.3	3	2		3		1						
C604-4.4	3	2				1						
C604-4.5	3	2										

1Low 2Medium 3High

19IT6708   HUMAN COMPUTER INTERACTION   L T P C
3 0 0 3

OBJECTIVE(S):

1. To learn the foundations of Human Computer Interaction.
2. To become familiar with the design technologies for individuals and persons with disabilities.
3. To be aware of mobile HCI.
4. To learn the guidelines for user interface

PRE-REQUISITE(S):

1. 19IT4605 -Software Engineering Methodologies
2. 19IT5601 - Web Programming

UNIT I   FOUNDATIONS OF HCI   9

The Human: I/O channels –Memory –Reasoning and problem solving; The Computer: Devices –Memory –processing and networks; Interaction: Models –frameworks – Ergonomics –styles –elements –interactivity-Paradigms. -Case Studies.

UNIT II   DESIGN & SOFTWARE PROCESS   9

Interactive Design: Basics –process –scenarios –navigation –screen design –Iteration and prototyping. HCI in software process: Software life cycle –usability engineering – Prototyping in practice –design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III   MODELS AND THEORIES   9

HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements –
Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV   MOBILE HCI   9

Mobile Ecosystem: Platforms, Application frameworks-Types of Mobile Applications:
Widgets, Applications, Games-Mobile Information Architecture, Mobile 2.0, Mobile
Design: Elements of Mobile Design, Tools. -Case Studies.

UNIT V   WEB INTERFACE DESIGN   9

Designing Web Interfaces–Drag & Drop, Direct Selection, Contextual Tools, Overlays,
Inlays and Virtual Pages, Process Flow -Case Studies.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, ―Human Computer
   Interaction‖, 3rd Edition, Pearson Education, 2004
2. Brian Fling, ―Mobile Design and Development‖, First Edition, O‚Reilly Media Inc.,
   2009.
3. Bill Scott and Theresa Neil, ―Designing Web Interfaces‖, First Edition, O‚Reilly,
   2009.

COURSE OUTCOME(S):

C605-3.1   Design effective dialog for HCI

C605-3.2   Design effective HCI for individuals and persons with disabilities.

C605-3.3   Assess the importance of user feedback.

C605-3.4   Explain the HCI implications for designing multimedia/ ecommerce/ e-learning
            Web sites.

C605-3.5   Develop meaningful user interface.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C605-3.1	3						3					
C605-3.2	3	2	3	3	3							

C605-3.3		2	3		2						
C605-3.4	3				3	3	3				
C605-3.5	3				3	3	3				

1Low 2Medium 3High

19IT6709   **BIOINFORMATICS**   **L T P C**

                                                          3 0 0 3

OBJECTIVE(S):

1. Understand the foundations of Bioinformatics.
2. Learn the technologies involved in Genome Identification and Prediction.
3. Know about Protein structure and predictions and its alignment computations..
4. Learn about the tools used in Bioinformatics.

PRE-REQUISITE(S): Computational Biology

UNIT I   INTRODUCTION TO BIOINFORMATICS   9

Introduction- Historical overview- Definition-Applications- Major Databases- Data management & Analysis - Molecular Biology and Bioinformatics - Central Dogma of Molecular Biology. Information search & data retrieval : Introduction, Tools for Web Search, Data Retrieval Tools and Data Mining of Biological Databases.

UNIT II   GENOME ANALYSIS IDENTIFICATION AND PREDICTION   9

Introduction - Genome Analysis - Genome Mapping - The Sequence Assembly Program - Cloning the entire Genome - Genome Sequencing - The Human Genome Project. Gene identification &prediction : Basis of Gene Prediction, Pattern Recognition, Gene Prediction Methods.

UNIT III   ALIGNMENTS AND PHYLOGENETIC TREES   9

Introduction to Sequence Alignment - The dotplot - Dotplots and Sequence Alignments - Measures of Sequence similarity - Computing the Alignment of two sequences - The dynamic programming algorithm Signature of alignments - Multiple sequence alignment - Applications - Phylogeny - Phylogenetic trees.

UNIT IV   PROTEIN STRUCTURE AND DRUG DISCOVERY   9

Protein Stability and Folding - Applications of Hydrophobicity - Superposition of structures - DALI - Evolution of Protein Structures - Classification of Protein Structures - Protein

Structure prediction and modeling - Assignment of protein structures to genomes - Prediction of protein function - Drug discovery and development.

UNIT V   TOOLS IN BIOINFORMATICS   9

Sequence Alignment Tools : FASTA - BLAST - CLUSTAL. Accessing Database Archives: ENTREZ -ExPASy-SRS-Ensembl.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Rastogi. S. C, Mendiratta. N and Rastogi. P. Bioinformatics Methods and Applications : Genomics, Proteomics and Drug Discovery. Prentice-Hall of India Pvt. Ltd.4th Edition, 2013."

2. Arthur M Lesk, "Introduction to Bioinformatics", Oxford University Press, India, Fourth Edition, 2013. (Alignments And Phylogenetic Trees, Protein Structure And Drug Discovery, Tools In Bioinformatics).

REFERENCE BOOK(S):

1. Jin Xiong, "Essential Bioinformatics", Cambridge University Press, 2006.

2. Affward T.K., Parry Smith D.J., "Introduction to Bioinformatics:, Pearson Education, Reprint, 2007.

3. Dr. ZhumurGhosh, Dr. BibekanandMallick, "Bioinformatics. Principles and Application", Oxford University Press, India, Reprint, 2008.

COURSE OUTCOME(S):

C605-4.1   Description of fundamental concepts in molecular biology and genomics

C605-4.2   Explain the concepts of Genome analysis.

C605-4.3   Analyze gene sequences using appropriate sequence alignment methods

C605-4.4   Illustrate the structure of protein, its classification, functions and the steps in drug discovery and development

C605-4.5   Demonstrate the usage of sequence alignment tools and bioinformatics search engines to retrieve data.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C605-4.1	3	3	3		3							3

C605-4.2	3	3	3		3							3
C605-4.3	3	3	3		3							3
C605-4.4	3	3	3		3							3
C605-4.5	3	3	3		3							3

1Low 2Medium 3High

19IT6710   PRINCIPLES OF MANAGEMENT   L T P C
3 0 0 3

OBJECTIVE(S):

1. Develop ability to critically analyze and evaluate a variety of management practices in the contemporary context

2. Understand and apply a variety of management and organizational theories in practice

3. Mirror existing practices or to generate their own innovative management competencies required for today's complex and global workplace

4. Critically reflect on ethical theories and social responsibility ideologies to create sustainable organizations.

PRE-REQUISITE(S):Nil

UNIT I   INTRODUCTION TO MANAGEMENT   9

Introduction to Management: definitions, managerial roles and functions; Science or Art perspectives-External environment-global, innovative and entrepreneurial perspectives of Management –Managing people and organizations in the context of New Era-Managing forcompetitive advantage -the Challenges of Management Early Contributions and Ethics in Management: **Early Contributions and Ethics in Management:** Scientific Management-contributions of Taylor, Gilbreths, Human Relations approach-contributions of Mayo, McGregor's Theory, Ouchi's Theory Z.

UNIT II   ETHICS IN MANAGEMENT   9

Systems Approach, the Contingency Approach, the Mckinsey 7-S Framework Corporate Social responsibility-Managerial Ethics.**Planning:** Nature and importance of planning, - types of plans - Steps in planning, Levels of planning -The Planning Process. – MBO.

UNIT III   ORGANISING FOR DECISION MAKING   9

Nature of organizing, organization levels and span of control in management Organisational design and structure –departmentation, line and staff concepts.Limitations of decision making-Evaluation and selecting from alternatives-programmed and nonprogrammed decisions -decision under certainty, uncertainty and risk-creative process and innovation.

UNIT IV   STAFFING AND RELATED HRD FUNCTION   9

Definition, Empowerment, staff –delegation, decentralization and recentralisation of authority –Effective Organizing and culture-responsive organizations –Global and entrepreneurial organizing.Manager inventory chart-matching person with the job-system approach to selection. Job design-skills and personal characteristics needed in managers-selection process, techniques and instruments.

UNIT V   LEADING AND CONTROLLING   9

Leading and Controlling: Leading Vs Managing –Trait approach and Contingency approaches to leadership -Dimensions of Leadership. Leadership Behavior and styles –Transactional and Transformational Leadership. Basic control process-control as a feedback system –Feed Forward Control –Requirements for effective control –control techniques –Overall controls and preventive controls –Global controlling.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Harold Koontz and Heinz Weihrich, "Essentials of Management", McGraw Hill Companies, 10th Edition, 2015.

2. Richard Daft, "New era Management", Cengage Learning, 11th Edition, 2014.

REFERENCE BOOK(S):

1. Heinz Weirich, Mark V Cannice and Harold Koontz, Management: a Global, Innovative and Entrepreneurial Perspective, McGraw Hill Education, 14th Edition.

2. Peter F Drucker, The Practice of Management, McGraw Hill, New York.

3. Robbins and Coulter, Management, 13th Edition, 2016, Pearson Education.

4. I.M .Pandey, Financial Management, Vikas Publishing House. New Delhi.

COURSE OUTCOME(S):

C605-5.1   Recall and identify the relevance of management concepts.

C605-5.2   Describe, discuss and relate management techniques adopted within an organization.

C605-5.3   Apply management techniques for meeting current and future management

challenges faced by the organization.

C605-5.4 Assess and modify different theories of management so as to relate it to current management challenges.

C605-5.5 Apply principles of management in order to execute the role as a manager

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
C605-5.1						3					3	
C605-5.2						3		3	3		3	3
C605-5.3									3		3	3
C605-5.4											3	3
C605-5.5						3			3	3	3	

1Low 2Medium 3High

19IT6711 NETWORK MANAGEMENT **L T P C**
3 0 0 3

COURSE OBJECTIVES:

The course will enable students to:

1. To understand the principles of network management, different standards
2. To understand the various protocols used in managing complex networks.
3. To understand the Automation of network management operations and making use of readily available network management systems.

PREREQUISITE:

 19IT4602 – Data Communication and Computer Networks

UNIT I DATA COMMUNICATION AND NETWORK MANAGEMENT OVERVIEW **9**

Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System

Management, Network Management System Platform, Current Status and future of Network Management.

UNIT II   SNMP V1,V2 AND V3   9

SNMPV1 NETWORK MANAGEMENT MANAGED NETWORK: Organization and Information Models MANAGED NETWORK: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model. SNMPV1 NETWORK MANAGEMENT: Communication and Functional Models The SNMP Communication Model, Functional model. SNMP MANAGEMENT: SNMPv2 Major Changes in SNMPv2, SNMPv2 System architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1.

UNIT III   RMON AND TELECOMMUNICATION NETWORK   9

SNMP MANAGEMENT: RMON : What is Remote Monitoring? ,RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON TELECOMMUNICATIONS MANAGEMENT NETWORK: Why TMN? , Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, Implementation Issues.

UNIT IV   NETWORK MANAGEMENT TOOLS AND SYSTEMS   9

Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

UNIT V   WEB-BASED MANAGEMENT   9

NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network , Future Directions. Case Studies.   **TOTAL HOURS : 45**

TEXT BOOK(S):
1. Mani Subramanian, "Network Management Principles and Practice", 2nd Edition, Pearson Education, 2010.

REFERENCE(S):

1. Morris, "Network management", 1st Edition, Pearson Education, 2008.
2. Mark Burges, "Principles of Network System Administration", 1st Edition, Wiley DreamTech, 2008.

COURSE OUTCOMES:

C605-6.1	Acquire the knowledge about network management standards (OSI and TCP/IP)
C605-6.2	Acquire the knowledge about various network management tools and the skill to use them in monitoring a network
C605-6.3	Analyze the challenges faced by Network managers
C605-6.4	Evaluate various commercial network management systems and open network management systems.
C605-6.5	Analyze and interpret the data provided by an NMS and take suitable actions.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
C605-6.1	3				3			2			3	
C605-6.2		3		3			2			3		2
C605-6.3					3							
C605-6.4			3						3			
C605-6.5		3					2				2	

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
PROFESSIONAL ELECTIVE – V
VII SEMESTER

Code No	Course	L	T	P	C
19IT7701	Artificial Intelligence	3	0	0	3
19IT7702	Digital Image Acquisition and processing	3	0	0	3
19IT7703	Software Architecture	3	0	0	3
19IT7704	Data Centre Networks	3	0	0	3
19IT7705	Cyber Forensics	3	0	0	3

19IT7701   ARTIFICIAL INTELLIGENCE   **L T P C**

                                                              3 0 0 3

OBJECTIVES:

The course will enable students to:

1. To impart basic knowledge about the artificial intelligence and generic problem-solving methods
2. To understand the basic techniques of knowledge representation and reasoning
3. To learn to construct plans of actions
4. To study network models used for reasoning in uncertainty
5. To know how to learn from sample of data

PRE-REQUISITE:

 Strong hold on Mathematics, experience of programming languages, Good knowledge of Discrete mathematics. Writing algorithm for finding patterns and learning. Strong data analytics skills.

UNIT I   SEARCHING   9

Intelligent Agents - Problem Solving - Solving Problems by Searching – Problem Solving Agents - Searching for Solutions - Uninformed Search Strategies - Informed Search Strategies - Heuristic Functions

UNIT II KNOWLEDGE AND REASONING 9

Reading – Logic Agent - Knowledge based agent - Wumpus world - Logic - Propositional logic - Syntax and Semantic of First Order Logic(FOL) - Using FOL – Knowledge engineering in FOL - Propositional vs First order inference - Unification and Lifting - Forward chaining - Backward chaining - Resolution

UNIT III PLANNING 9

Classical Planning - Definitions - Examples - Algorithms for Planning as state space search - Planning graphs - Planning and acting in the real world - Time - Schedule and Resources - Hierarchical planning and acting in Non deterministic domain

UNIT IV UNCERTAIN KNOWLEDGE AND REASONING 9

Quantifying uncertainty - Acting under uncertainty - Basic probability notation - Inference using full joint distribution - Probabilistic Reasoning - Semantics of Bayesian networks - Bayesian nets with continuous variable - Exact inference in Bayesian networks

UNIT V LEARNING 9

Forms of learning - Supervised learning - Learning decision trees – Artificial neural networks - Support vector machine – Applications - Object Recognition – Robotics

TOTAL HOURS: 45

TEXT BOOKS(S):

1. Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2014.

REFERENCE(S):

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Morgon Kaufmann Publishers (Elsevier), 2000.

2. . Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill, Second Edition, 2003.

3. George F. Luger, "Artificial Intelligence-Structures and Strategies for Complex Problem Solving", Pearson Education, Fourth Edition, 2002. Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.

4. Bratko.I, "Prolog Programming for Artificial Intelligence (International Computer Science Series)", Addison-Wesley Educational Publishers Inc, Fourth edition, 2011.

5. David L. Poole, Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO703-1.1   Apply different searching strategies for problem solving

CO703-1.2   Apply syntactic and semantic rules to infer knowledge and reasoning

CO703-1.3   Apply various algorithms for planning

CO703-1.4   Handle uncertainty using probabilistic reasoning

CO703-1.5   Implement supervised learning methods for given applications

PO vs CO Mapping

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-1.1	3								3			
CO703-1.2				3							3	
CO703-1.3		3				3		3				
CO703-1.4												
CO703-1.5					3							3

1Low 2Medium 3High

19IT7702   DIGITAL   IMAGE   ACQUISITION   AND   PROCESSING

L T P C

3 0 0 3

COURSE OBJECTIVES:

The course will enable students to:

1. To become familiar with digital image fundamentals
2. To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
3. To learn concepts of degradation function and restoration techniques.
4. To study the image segmentation and representation techniques.
5. To become familiar with image compression and recognition methods

PREREQUISITES:

 19IT3201 – Probability & Statistics,19IT6707 – Digital Signal Processing

UNIT I   DIGITAL IMAGE FUNDAMENTALS AND IMAGE ACQUISITION   9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Acquisition Techniques – Image Acquisition Devices - Image Sampling and Quantization – Relationships between pixels   Color image fundamentals – RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms – DFT, DCT.

UNIT II   IMAGE ENHANCEMENT   9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT III   IMAGE RESTORATION   9

Image Restoration – degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV   IMAGE SEGMENTATION   9

Edge detection, Edge linking via Hough transform – Thresholding – Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V   IMAGE COMPRESSION AND RECOGNITION   9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing Pearson, Fourth Edition, 2018.
2. S. Birchfield, Image Processing and Analysis, Cengage Learning, 2018.

REFERENCE(S):

1. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, "Digital Image Processing using MATLAB", Gatesmark Publishing,2020.

2. M. Sonka, V. Hlavac, and R. Boyle, "Image Processing, Analysis and Machine Vision", Cengage Learning, 2015.

3. William K. Pratt, "Digital Image Processing", CRC Press, Taylor and Francis Group, 2013.

4. Kenneth R. Castleman, "Digital Image Processing Pearson", 2006.

5. Anil K. Jain, "Fundamentals of Digital Image Processing", Pearson, 2002

6. D,E. Dudgeon and RM. Mersereau, "Multidimensional Digital Signal Processing", Prentice Hall Professional Technical Reference, 1995.

COURSE OUTCOMES:

CO703-2.1   Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.

CO703-2.2   Operate on images using the techniques of smoothing, sharpening and enhancement.

CO703-2.3   Understand the restoration concepts and filtering techniques.

CO703-2.4   Learn the basics of segmentation, features extraction, compression and recognition methods for color models.

CO703-2.5   Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-2.1	3											
CO703-2.2	3	3										
CO703-2.3	3	3										
CO703-2.4	3	3										3
CO703-2.5	3											3

1Low 2Medium 3High

19IT7703	SOFTWARE ARCHITECTURE	L T P C
		3 0 0 3

Course Objectives

The course will enable students to:

1. Understand software architectural requirements and drivers
2. Be exposed to architectural styles and views
3. Be familiar with architectures for emerging technologies

PREREQUISITES:

 19IT4605 – Software Engineering Methodologies

UNIT I   INTRODUCTION AND ARCHITECTURAL DRIVERS   9

Introduction – What is software architecture? – Standard Definitions – Architectural structures – Influence of software architecture on organization-both business and technical – Architecture Business Cycle- Introduction – Functional requirements – Technical constraints – Quality Attributes.

UNIT II   QUALITY ATTRIBUTE WORKSHOP   9

Quality Attribute Workshop – Documenting Quality Attributes – Six part scenarios – Case studies.

UNIT III   ARCHITECTURAL VIEWS   9

Introduction – Standard Definitions for views – Structures and views - Representing views-available notations – Standard views – 4+1 view of RUP, Siemens 4 views, SEI's perspectives and views – Case studies

UNIT IV   ARCHITECTURAL STYLES   9

Introduction – Data flow styles – Call-return styles – Shared Information styles - Event styles – Case studies for each style.

UNIT V   DOCUMENTING THE ARCHITECTURE   9

Good practices – Documenting the Views using UML – Merits and Demerits of using visual languages – Need for formal languages - Architectural Description Languages – ACME – Case studies. Special topics: SOA and Web services – Cloud Computing – Adaptive structures

TOTAL HOURS: 45

TEXT BOOKS

1. Len Bass, Paul Clements, and Rick Kazman, "Software Architectures Principles and Practices", 3RD Edition, Addison-Wesley, 2013.
2. Mark Richards, Neal Ford, "Fundamentals of Software Architecture: An Engineering Approach",O"REILLY, 2020.

3. Anthony J Lattanze, "Architecting Software Intensive System. A Practitioner's Guide", Auerbach Publications, 2010.

REFERENCES

1. Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, Paulo Merson, Robert Nord, and Judith Stafford, "Documenting Software Architectures. Views and Beyond", 2nd Edition, Addison-Wesley, 2010.

2. Paul Clements, Rick Kazman, and Mark Klein, "Evaluating software architectures: Methods and case studies. Addison-Wesley, 2001.

3. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, "Cloud Computing. Principles and Paradigms", John Wiley & Sons, 2011

4. Mark Hansen, "SOA Using Java Web Services", Prentice Hall, 2007

5. David Garlan, Bradley Schmerl, and Shang-Wen Cheng, "Software Architecture-Based SelfAdaptation," 31-56. Mieso K Denko, Laurence Tianruo Yang, and Yan Zang (eds.), "Autonomic Computing and Networking". Springer Verlag, 2009

COURSE OUTCOMES:

CO703-3.1   Explain influence of software architecture on business

CO703-2.2   Understand the technical activities of software.

CO703-2.3   Identify key architectural structures

CO703-2.4   Use styles and views to specify architecture

CO703-2.5   Design document for a given architecture

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO703-3.1	3	2	3	3								
CO703-2.2	3	3										
CO703-2.3	3	2	3	3								
CO703-2.4	3	3	3					2	2			3
CO703-2.5	3	3	3	3	3							

1Low 2Medium 3High

19IT7704   DATA CENTER NETWORKS   **L   T   P   C**

                                                                   3   0   0   3

OBJECTIVE(S):

1. To learn the basics of the Data Center Networking
2. Analyze Data Center topologies and virtualized environment
3. Learn the data traversal over SDN
4. Design algorithms for virtualization over multi-tenant environments
5. Understand the various types of key routing and switching techniques used in modern computer networks.

PRE-REQUISITE(S):Nil

UNIT I   DATA CENTER EVOLUTION AND SWITCH FABRICS   9

Networking Basics - Cloud Data Centers and Cloud Networking Characteristics - Mainframes and Servers - Enterprise Cloud and Virtualized Data Centers - Movement to Cloud - Switch Fabric Architecture - Switch Fabric Congestion Management and Flow Control - Switch Fabric Traffic Management - Switch Chip Architecture

UNIT II   DATA CENTER NETWORKING AND STANDARDS   9

Traditional Multi-tiered Enterprise Networks - Data Center Network Switch Types - Flat Data Center Networks - Rack Scale Architectures - Network Function Virtualization - Ethernet Data Rate Standards - Data Center Bridging - Improving Network Bandwidth - Remote Direct Memory Access

UNIT III   VIRTUALIZATION AND NETWORKING   8

Virtual Machines - Virtual Switching - PCI Express and Edge Virtual Bridging - VM Migration - Multi-tenant Environments - Traditional Network Tunneling Protocols - VXLAN and NVGRE Protocols - Tunnel Locations - Load Balancing Algorithms

UNIT IV   SOFTWARE DEFINED STORAGE AND NETWORKING   12

SDN Origins and Evolution – Introduction – Why SDN? - Centralized and Distributed Control and Data Planes - The Genesis of SDN - How SDN Works? - The Openflow Protocol - SDN Controllers- Conventional and Advanced Storage Technologies - Storage Communication Protocols - Software-Defined Storage - Storage in Cloud Data Centers - Data Center Software - OpenStack and OpenFlow - Network Function Virtualization - SDN Deployment - Software-Defined Infrastructure.

UNIT V   HIGH PERFORMANCE COMPUTING AND TRENDS   7

HPC System Architectures - Multi-socket CPU Boards - HPC Networking Standards - HPC Network Performance Factors - HPC Networking Software - Memory and Cabling Technology - Switch Fabric Technology -

TOTAL HOURS: 45

REFERENCE BOOK(S):

1. Gary Lee "Cloud Networking - Understanding Cloud-based Data Center Networks", , Elsevier, 2014

2. Kevin Corbin, Ron Fuller, David Jansen, "NX-OS and Cisco Nexus Switching: Next-Generation Data Center Architectures" , Cisco Press; 1 edition [ISBN: 9781587058929], 2010.

3. Larry L. Peterson, Bruce S. Davie, "Computer Networks – a system approach " 2/e,2007,Harcourt Asia PTE LTD.

4. Internetworking Technologies Handbook, Inc. Cisco Systems, ILSG Cisco.

5. Paul Goransson and Chuck Black ,"Software Defined Networks: A Comprehensive Approach" Morgan Kaufmann Publications, 2014

6. Thomas D. Nadeau & Ken Gray ,"SDN - Software Defined Networks", O'Reilly, 2013

7. SiamakAzodolmolky,"Software Defined Networking with OpenFlow", Packt Publishing, 2013

COURSE OUTCOME(S):

CO703-4.1   Understand the principles behind the Data Center Networking over the conventional network.

CO703-4.2   Ability to analyze Data Center topologies and virtualized environment

CO703-4.3   Understand SDN and analyse the Data traversal in SDN.

CO703-4.4   Design algorithms for virtualization over multi-tenant environments

CO703-4.5   Understand the various types of key routing and switching techniques used in modern computer networks.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-4.1	3		3		2							
CO703-4.2	3	3	3		2							

CO703-4.3	3	3	3									
CO703-4.4	3		3									
CO703-4.5	3		3		3							

1Low 2Medium 3High

19IT7705	**CYBER FORENSICS**	**L T P C**
		3 0 0 0

COURSE OBJECTIVES:

The student should be made to:

- Learn the security issues network layer and transport layer
- Be exposed to security issues of the application layer
- Learn computer forensics
- Be familiar with forensics tools
- Learn to analyze and validate forensics data

PREREQUISITES:

- 19IT6603 – Network and Information Security

UNIT I   NETWORK LAYER SECURITY &TRANSPORT LAYER SECURITY   9

IPSec Protocol - IP Authentication Header - IP ESP - Key Management Protocol for IPSec . Transport layer Security: SSL protocol, Cryptographic Computations – TLS Protocol.

UNIT II   E-MAIL SECURITY & FIREWALLS   9

PGP - S/MIME - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions.

UNIT III   INTRODUCTION TO COMPUTER FORENSICS   9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT IV   EVIDENCE COLLECTION AND FORENSICS TOOLS   9

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

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 HOURS : 45

TEXT BOOKS:

1. John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", Jones & Bartlett Learning, 3rd Edition 2010.

2. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.

3. Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2008.

REFERENCES:

1. John R. Vacca, "Computer Forensics", Cengage Learning, 2005

2. Richard E. Smith, "Internet Cryptography", 3rd Edition Pearson Education, 2008.

3. MarjieT. Britz, "Computer Forensics and Cyber Crime": An Introduction", 3 rd Edition, Prentice Hall, 2013.

COURSE OUTCOMES:

CO703-5.1   Discuss the security issues network layer and transport layer.

CO703-5.2   Apply security principles in the application layer.

CO703-5.3   Explain computer forensics.

CO703-5..4   Use forensics tools.

CO703-5.5   Analyze and validate forensics data.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO703-5.1	3	3		3				3	3	3	2	3
CO703-5.2	3	3		3				3	3	3	2	3
CO703-5.3	3	2	2		3	3	3	3	3	3	2	3
CO703-5..4	2		2		3				3	3	3	3
CO703-5.5	2		3	3		3	3	3	3	3	3	3

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

PROFESSIONAL ELECTIVE – VI

VII SEMESTER

Code No	Course	L	T	P	C
19IT7706	Soft Computing Techniques	3	0	0	3
19IT7707	Big Data Analytics and Models	3	0	0	3
19IT7708	Software Testing Techniques and Tools	3	0	0	3
19IT7709	Web Application Security	3	0	0	3
19IT7710	Ecommerce Systems	3	0	0	3
19IT7711	Quantum Computing	3	0	0	3

19IT7706   SOFT COMPUTING TECHNIQUES   L T P C

3 0 0 3

COURSE OBJECTIVE(S):

1. To learn about different tools and techniques used in soft computing
2. To apply the knowledge of Supervised and Unsupervised Learning techniques.
3. To have knowledge about Fuzzy Logic
4. To get knowledge in Optimization techniques and Intelligent Systems.

PRE-REQUISITE(S):

1. 19IT3602 - Data Structures & Algorithms
2. 19IT6601 - Artificial Intelligence

UNIT I   SOFT COMPUTING   9

Introduction – requirement - different tools and techniques - usefulness and applications.

UNIT II   ARTIFICIAL NEURAL NETWORK   9

Supervised Learning Neural Network, Hebb's learning, Perceptron, Adaline, Multilayer feed forward network, Back propagation, Radial Basis function networks, Support Vector Machine, Unsupervised Learning Neural Network, Competitive learning, Self-Organizing Feature Maps, Adaptive Resonance Theory, Case studies on classification and pattern recognition problems-Overview of deep learning.

UNIT III   FUZZY LOGIC   9

Introduction to fuzzy logic, fuzzy sets & relations, fuzzy arithmetic, Fuzzification and defuzzification, fuzzy decision making, Case studies on decision making problems.

UNIT IV   OPTIMIZATION   9

Introduction to traditional optimization and search techniques, Evolutionary algorithms and search space, General Genetic algorithm, operators, stopping criteria, constraints, Case studies on combinatorial problems.

UNIT V   SWARM INTELLIGENT ALGORITHMS   9

Ant Colony Optimization, Cemetery Organization and Brood Care - Particle swarm optimization- Basic PSO, Basic Variations, PSO Parameters, Case studies on combinatorial problems.

TOTAL HOURS: 45

TEXT BOOK(S):

1. S.N Sivanandam and S.N Deepa, Principles of Soft Computing, Second Ed. Wiley Publishers, 2013.

2. Andries P. Engelbrecht, Computational Intelligence: An Introduction, Second Ed, John Wiley & Sons, 2007.

3. Marco Dorigo, Thomas Stu¨ tzle, Ant Colony Optimization, A Bradford Book,The MIT Press Cambridge,2004.

4. James Kennedy and Russell Eberhart, "Particle Swarm Optimization", Proceedings of IEEE International Conference on Neural Networks, 1995.

5. Russell Eberhart and James Kennedy, "A New Optimizer Using Particle Swarm Theory", Sixth International Symposium on Micro Machine and Human Science, 1995.

6. Jürgen Schmidhuber, "Deep learning in neural networks: An overview", Neural Networks, Elsevier, Volume 61, January 2015, Pages 85–117.

7. Case studies - www.ibm.com/analytics/watson-analytics.

REFERENCE BOOK(S):

1. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley, 1989.

2. George J. Klir, Bo Yuan Fuzzy Sets and Fuzzy Logic Theory and Applications, Prentice Hall PTR, 1995.

3. Timothy J Ross, Fuzzy Logic with Engineering Applications, 3rd Edition, Wiley Publishers, 2010.

COURSE OUTCOMES:

CO703-1. 1 Describe the architecture and learning of various supervised and unsupervised artificial neural networks.

CO703-1. 2 Apply neural network learning to pattern classification and regression problems.

CO703-1. 3 Explain various parts of fuzzy logic based decision making process.

CO703-1. 4 Describe various processes of Genetic Algorithms such as initialization, selection, reproduction.

CO703-1. 5 Describe the basic procedure and parameters involved in Ant Colony Optimization and Particle swarm optimization algorithms.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO703-1. 1	3					2		1				
CO703-1. 2	3	3	3	3								
CO703-1. 3	3	3	3	3								
CO703-1. 4	3	3	3	3					2			2
CO703-1. 5	3	3	3	3					2			2

1Low 2Medium 3High

19IT7707   BIG DATA ANALYTICS AND MODELS   L T P
                                                                                    C
                                                                              3 0 0 3

COURSE OBJECTIVES:

1. To know the fundamental concepts of big data and analytics.

2. To explore tools and practices for working with big data

3. To provide an overview of Apache Hadoop

4. To provide HDFS Concepts and Interfacing with HDFS

5. To Understand Map Reduce Jobs

6. To learn about stream computing.

PREREQUISITE :

Data Analytics,Advanced Databases

UNIT I   INTRODUCTION TO BIG DATA   9

Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating - The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of High- Performance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model

UNIT II   HDFS(Hadoop Distributed File System)   9

The Design of HDFS, HDFS Concepts,Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III   MAP REDUCE   9

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT IV   STREAM MEMORY   9

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNIT V   NOSQL   DATA   MANAGEMENT   FOR   BIG   DATA   AND VISUALIZATION   9

NoSQL Databases : Schema-less Models‖: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding –- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R.

TEXT BOOK(S):

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

3. Tom White " Hadoop: The Definitive Guide" Third Edit on, O"reily Media, 2012.

4. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCE(S):

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.

2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.

3. Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.

4. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.

5. Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO703-2. 1   Understand basics of Big Data Analytics

CO703-2. 2   Learn implementation of HDFS, data structures and interfaces

CO703-2. 3   Work with big data tools and its analysis techniques

CO703-2. 4   Perform analytics on data streams

CO703-2. 5   Learn NoSQL databases and management

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO703-2. 1	3	1	1	3								
CO703-2. 2	3	1	2	3	3			1				
CO703-2. 3	2		2	3	3			1				2

CO703-2. 4	3		3								3	2
CO703-2. 5				3	3				1			2

1Low 2Medium 3High

19IT7708   SOFTWARE TESTING - TECHNIQUES AND TOOLS   L T P C
3 0 0 3

COURSE OBJECTIVES:

The course will enable students to:

- To learn the criteria for test cases.
- To learn the design of test cases.
- To understand test management and test automation techniques
- To apply test metrics and measurements

PRERQUISITE:

- 19IT4605 – Software Engineering Methodologies

UNIT I   INTRODUCTION   9

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model- Testing axioms – Basic definitions – Software Testing Principles – The Tester‚‚s Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design –Defect Examples- Developer/Tester Support of Developing a Defect Repository.

UNIT II   TEST CASE DESIGN STRATEGIES   9

Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing - Random Testing – Requirements based testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches, Evaluating Test Adequacy Criteria.

UNIT III   LEVELS OF TESTING   9

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests –

Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing –Compatibility testing – Testing the documentation – Website testing.

UNIT IV TEST MANAGEMENT 9

People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group- The Structure of Testing Group- .The Technical Training Program.

UNIT V TEST AUTOMATION 9

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics, selenium

TOTAL HOURS: 45

TEXT BOOK(S):

1. Srinivasan Desikan and Gopalaswamy Ramesh, ―Software Testing – Principles and Practices, Pearson Education, 2006.
2. Ron Patton, ―Software Testing, Second Edition, Sams Publishing, Pearson Education, 2007.

REFERENCE(S):

1. Ilene Burnstein, ―Practical Software Testing‖, Springer International Edition, 2003.
2. Edward Kit,"Software Testing in the Real World – Improving the Process", Pearson Education, 1995.
3. Boris Beizer,"Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold, New York, 1990.
4. Aditya P. Mathur, ―Foundations of Software Testing _ Fundamental Algorithms and Techniques‖, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008

COURSE OUTCOMES:
At the end of the course, the students will be able to:

CO703-3. 1   Design test cases suitable for a software development for different domains.

CO703-3. 2   Identify suitable tests to be carried out.

CO703-3. 3   Prepare test planning based on the document.

CO703-3. 4   Document test plans and test cases designed.

CO703-3. 5   Use automatic testing tools and validate a test plan.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO703-3. 1	3		2				2			3	2	
CO703-3. 2	2	3	2	3	2	2	2				2	2
CO703-3. 3	3	2	2	2	3	2	3				2	2
CO703-3. 4	3	3	2	3	3	3	2	3			2	2
CO703-3. 5	2	3	2	3	2	2	3	2		2	3	2

1Low 2Medium 3High

19IT7709   WEB APPLICATION SECURITY   L T P C

3 0 0 3

COURSE OBJECTIVES:

1. To understand the fundamental concept of security.
2. To understand the authentication principle concept of web Application Security.
3. To understand the authorization principle concept of web Application Security.
4. To gain the knowledge about the security concept of file system.
5. To gain the knowledge about the security concept of Database systems.

PREREQUISITE:

 ⬜ 19IT4601 - Data Base Systems

 ⬜ 19IT5601 – Web Programming

UNIT I   SECURITY FUNDAMENTALS   9

Input Validation: Blacklist Validation, Whitelist Validation, More Validation Practices, The Defense-in-Depth Approach, Attack Surface Reduction, Classifying and Prioritizing Threats.

UNIT II   WEB APPLICATION SECURITY: AUTHENTICATION   9

Access Control Overview, Authentication Fundamentals, Two-Factor and Three-Factor

Authentication, Web Application Authentication, Securing Password-Based Authentication, Secure Authentication Best Practices.

UNIT III   WEB APPLICATION SECURITY: AUTHORIZATION   9

Access Control Command, Session Management Fundamentals, Securing Web Application Session Management.

UNIT IV   FILE SECURITY PRINCIPLES   9

Keeping Your Source Code Secret, Security Through obscurity, Forceful Browsing, Directory Traversal.

UNIT V   DATABASE SECURITY PRINCIPLES   9

Structured Query Language (SQL) Injection, Setting Database Permissions, Stored Procedure Security, Insecure Direct Object References.

TOTAL HOURS : 45

TEXT BOOK(S):

1. Web Application Security – A Beginners Guide, Bryan Sullivan, Vincent Liu, McGraw Hill Publication, 2012.

REFERENCE(S):

1. Joel Scambray, Vincent Liu, Caleb Sima, "Hacking Exposed Web Applications", McGraw Hill, 3rd Edition, 2011.
2. Dafydd Stuttard, Marcus Pinto, "The Web Application Hacker's Handbook Discovering and Exploiting Security Flaws" , 2nd Edition, Wiley Publication, 2008.
3. Rich Bowen, Ken Coar, "Apache Cookbook", O"Reilly Publication, 2nd Edition, 2008.
4. Open Web Application Security Project. A Guide to Building Secure Web Applications and Web Services
   http://www.owasp.org/index.php/Category:OWASP_Guide_Project

COURSE OUTCOMES:

On Successful completion of the course students will be able to

CO703-4. 1   To enhance the fundamental concept of web security.

CO703-4. 2   To apply the authentication principle concept of web Application Security.

CO703-4. 3   To apply the authorization principle concept of web Application Security.

CO703-4. 4   To perform security operations on file systems.

CO703-4. 5   To perform security operations on Database systems.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO703-4. 1	3					2		1				
CO703-4. 2	3	3	3	3								
CO703-4. 3	3	3	3	3								
CO703-4. 4	3	3	3	3					2			2
CO703-4. 5	3	3	3	3					2			2

1Low 2Medium 3High

19IT7710   E-COMMERCE SYSTEMS   L T P C

3 0 0 3

COURSE OBJECTIVES:

1. To Learn the E-Commerce Platform and its concepts
2. To Understand the Technology, infrastructure and Business in E-Commerce
3. To Understand the Security and Challenges in E-Commerce
4. To Build an Own E-Commerce using Open Source Frameworks

PREREQUISITE:

   ⬚   19IT5601 – Web Programming

UNIT I   INTRODUCTION   9

E-commerce: E-commerce and E-business - Features of E-commerce Technology - Types of E-commerce. Understanding Ecommerce: Technology - Business and Society. E-commerce Business Models and Concepts: Eight Key Elements - Strategy, Structure and Process: Industry Structure - Industry Value Chains - Firm Value Chains - Firm Value Webs - Business Strategy

UNIT II BUILDING AN E-COMMERCE WEBSITE, MOBILE SITE AND APPS   9

Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web

Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App

UNIT III   E-COMMERCE SECURITY AND PAYMENT SYSTEMS   9

E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems

UNIT IV   BUSINESS CONCEPTS IN E-COMMERCE   9

Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing – Ethical, Social, Political Issues in E-Commerce

UNIT V   E-COMMERCE,   SUPPLY   CHAIN   AND   COLLABORATIVE
**   MANAGEMENT   9**

Defining and Measuring the Growth of B2B Commerce - Benefits and Challenges of B2B E-commerce - The Procurement Process and Supply Chain - Types of Procurement. Trends in Supply Chain Management and Collaborative Commerce: Justin-Time and Lean Production - Supply Chain Simplification - Adaptive Supply Chains - Accountable Supply Chains – Sustainable Supply Chains - Electronic Data Interchange - Supply Chain Management Systems - Collaborative Commerce.

TOTAL HOURS: 45

TEXT BOOK(S):
1. Kenneth C.Laudon, Carol Guercio Traver ―E-Commerce‖, Pearson, 10th Edition, 2016

REFERENCES(S):
1. Ravi Kalakota, Andrew Whinston, "Frontiers of Electronic Commerce", Pearson India, fourteenth Reprint 2007.
2. Dave Chaffey, "E - Business and E - Commerce Management: Strategy, Implementation, and Practice:" Pearson India, Sixth Edition, 2013.
3. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, "E-Commerce, Fundamentals and Applications", Wiley India Private Ltd Reprint 2008.
4. http://docs.opencart.com/
5. **http://devdocs.magento.com/**

6. http://doc.prestashop.com/display/PS15/Developer+tutorials

7. Robbert Ravensbergen, ―Building E-Commerce Solutions with WooCommerce‖, PACKT, 2nd Edition. 2015.

COURSE OUTCOMES:

On Successful completion of the course students will be able to

CO703-5. 1   Understand the concept behind the E-commerce.

CO703-5. 2   Manage, Maintain and Support Web Apps

CO703-5. 3   Use the knowledge on the mechanics of building a secure e-commerce website and payment systems.

CO703-5. 4   Describe the features of e-commerce, various business models and marketing strategies used in e-commerce.

CO703-5. 5   Illustrate the procurement process and supply chain management in B2B e-commerce.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-5. 1	3	2	2	2	2							
CO703-5. 2	2	2	3	2	2				3			
CO703-5. 3	3		2	3	2							
CO703-5. 4	2	2	2	3	3							
CO703-5. 5	3	2	2	3	3				3			3

1Low 2Medium 3High

19IT7711	QUANTUM COMPUTING	L T P C
		3 0 0 3

COURSE OBJECTIVES:

1· To learn the fundamental concepts behind quantum computation and quantum mechanics

2· To learn the basics of quantum computation and information and the theory behind it.

3· To know the background knowledge about quantum algorithms.

4· To understand the design of quantum algorithms follows completely different principles.

5· To gain knowledge about the basic theory of quantum information.

PREREQUISITES:

Basic quantum physics, Linear algebra, Information Theory and Coding , Fourier Transforms

UNIT I FUNDAMENTAL CONCEPTS AND QUANTUM MECHANICS 9

Global Perspectives – Quantum Bits – Quantum Computation – Quantum Algorithms – Experimental Quantum Information Processing – Quantum Information- Quantum Mechanics: Linear Algebra – Postulates of Quantum Mechanics – Application: Superdense Coding – Density Operator – The Schmidt Decomposition and Purifications – EPR and the Bell Inequality

UNIT II QUANTUM COMPUTATION AND INFORMATION 9

Quantum Circuits: Quantum Algorithms – Universal Quantum Gates – Quantum Circuit Model of Computation – Simulation – Quantum Computers - Quantum Noise and Quantum Operations: Classical Noise and Markov processes – Quantum Operations – Examples – Applications – Distance Measures for Quantum Information – Quantum Error Correction – Entropy.

UNIT III QUANTUM ALGORITHMS – I 9

Superdense coding – quantum teleportation – applications of teleportation – probabilistic versus quantum algorithms – phase kick-back – the Deutsch algorithm – the Deutsch- Jozsa algorithm – Simon's algorithm – Quantum phase estimation and quantum Fourier Transform – eigenvalue estimation.

UNIT IV   QUANTUM   ALGORITHMS –II 9

Order-finding problem – eigenvalue estimation approach to order finding – Shor's algorithm for order finding – finding discrete logarithms – hidden subgroups–Grover's   quantum search algorithm – amplitude amplification – quantum amplitude estimation –quantum counting – searching without knowing the success probability

UNIT V QUANTUM INFORMATION THEORY 9

Quantum States and Accessible Information – Data Compression – Classical Information Over Noisy Quantum Channels – Quantum Information Over Noisy Quantum Channels – Entanglement as a Physical Resource – Quantum Cryptography.

TEXT BOOK:

1. Michael A. Nielsen, Issac L. Chuang, "Quantum Computation and Quantum Information", Tenth Edition, Cambridge University Press, 2010.
2. P. Kaye, R. Laflamme, and M. Mosca, "An introduction to Quantum Computing", Oxford University   Press, 1999.

REFERENCES:

1. Scott Aaronson, "Quantum Computing Since Democritus", Cambridge

University Press, 2013. 2. N. David Mermin, "Quantum Computer Science: An Introduction", Cambridge University Press, 2007.

2.V. Sahni, "Quantum Computing", Tata McGraw-Hill Publishing Company, 2007.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student will be able to:

1. Understand the basics of quantum computing and Mechanics.

2. Understand the background of Quantum computation and Information.

3. Analyze the computational algorithms.

4. Understand all the quantum algorithms and implementation.

5.Appreciate the need of quantum information theory.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO707-5.1	3	3		3				3	3	3	2	3
CO707-5.2	3	3		3				3	3	3	2	3
CO707-5.3	3	2	2		3	3	3	3	3	3	2	3
CO707-5..4	2		2		3				3	3	3	3
CO707-5.5	2		3	3		3	3	3	3	3	3	3

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

PROFESSIONAL ELECTIVE – VII

VIII SEMESTER

Code No	Course	L	T	P	C
19IT8701	Deep Learning Algorithms	3	0	0	3
19IT8702	Data Driven Business Intelligence	3	0	0	3
19IT8703	Multi Core Architectures and Programming	3	0	0	3
19IT8704	Agile Methodologies and Devops	3	0	0	3
19IT8705	Natural Language Processing	3	0	0	3

19IT8701   DEEP LEARNING   ALGORITHMS   **L T P C**

3 0 0 3

COURSE OBJECTIVE(S):

1. To impart the basic knowledge about deep learning paradigms

2. To learn about neural networks and its models.

3. To have an insight about deep neural networks and build an system.

4. To learn about the underlying implementations and techniques for optimization.

5. To learn about the architectures and tools useful in implementing deep learning concepts.

PRE-REQUISITE(S):

1. 19IT7701   Artificial Intelligence

UNIT I   INTRODUCTION   9

Introduction to deep learning – Strategies of deep learning: Learning via Gradient Descent; recursive chain rule (back propagation); time: bias-variance tradeoff, regularization; output units: linear, softmax; hidden units: RELU, dropouts. Applications of deep learning.

UNIT II   NEURAL NETWORKS   9

Neural Networks basics - Binary Classification, Logistic Regression, Gradient Descent, Derivatives, Computation graph, Vectorization, Vectorizing logistic regression – Shallow neural networks: Activation functions, non-linear activation functions, Backpropagation, Data classification with a hidden layer

UNIT III   DEEP NEURAL NETWORKS   9

Deep Neural Networks: Deep L-layer neural network, Forward and Backward propagation, Deep representations, Parameters vs Hyperparameters, Building a Deep Neural Network (Application) - Supervised Learning with Neural Networks

UNIT IV   PRACTICAL ASPECTS OF DEEP LEARNING   9

Practical aspects of Deep Learning: Train/Dev / Test sets, Bias/variance, Overfitting and regularization, Linear models and optimization, Vanishing/exploding gradients, Gradient checking – Logistic Regression, Convolution Neural Networks, RNN and Backpropagation – Convolutions and Pooling.

UNIT V   DEEP LEARNING ARCHITECTURES   9

Neural Network Architectures – Recurrent Neural Networks, Adversarial NN, Spectral CNN, Self-Organizing Maps, Restricted Boltzmann Machines, Long Short-Term Memory Networks (LSTM) and Deep Reinforcement Learning – TensorFlow, Keras or MatConvNet for implementation.

TOTAL HOURS : 45

TEXT BOOKS(S):

1. Ian Goodfellow, Yoshua Bengio and Aeron Courville, "Deep Learning", MIT Press, First Edition, 2016.
2. Adam Gibson and Josh Patterson, "Deep Learning, A practitioner"s approach", O"Reilly, First Edition, 2017.

REFERENCE(S):

1. Aurelien Geron, "Hands-On Learning with Scikit-Learn and Tensorflow", O"Reilly, First Edition, 2017.
2. Francois Chollet, "Deep Learning with Python", Manning Publications Co, First Edition, 2018.
3. Yuxi (Hayden) Liu, "Python Machine Learning by Example", First Edition, 2017.

4. Phil Kim, "Matlab Deep Learning with Machine Learning, Neural Networks and Artificial Intelligence", Apress, 2017

COURSE OUTCOMES:

CO801 – 1.1   Understand deep learning and various terms involved in it and its applicatiom

CO801 – 1.2   Understand the neural networks and the various activation functions.

CO801 – 1.3   Understand deep neural networks and build a neural network system.

CO801 – 1.4   Understand the practical aspects of Deep Learning.

CO801 – 1.5   Understand and design a Deep Learning system using the various tools.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO801 – 1.1	3					2		1				
CO801 – 1.2	3	3	3	3								
CO801 – 1.3	3	3	3	3								
CO801 – 1.4	3	3	3	3					2			2
CO801 – 1.5	3	3	3	3					2			2

1Low 2Medium 3High

19IT8702   DATA DRIVEN BUSINESS INTELLIGENCE   **L T P C**
                                                          3 0 0 3

COURSE OBJECTIVES:

The student should be made to:

1. Be exposed with the basic rudiments of business intelligence system
2. Understand the modeling aspects behind Business Intelligence
3. Understand of the business intelligence life cycle and the techniques used in it
4. Be exposed with different data analysis tools and techniques

PREREQUISITES:

  19IT6601 – Data Mining And Analytics

UNIT I   BUSINESS INTELLIGENCE   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   KNOWLEDGE DELIVERY   9

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

UNIT III   EFFICIENCY   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. Pattern matching – cluster analysis, outlier analysis

UNIT IV   BUSINESS INTELLIGENCE APPLICATIONS   9

Marketing models – Logistic and Production models – Case studies.

UNIT V   FUTURE OF BUSINESS INTELLIGENCE   9

Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.

TOTAL HOURS: 45

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO801-2. 1   Explain the fundamentals of business intelligence.

CO801-2. 2   Explain the data analysis and knowledge delivery stages.

CO801-2. 3   Link data mining with business intelligence.

CO801-2. 4   Apply various modeling techniques.

CO801-2. 5   Apply business intelligence methods to various situations and decide on appropriate technique.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO801-2. 1	3	3										
CO801-2. 2	3	3										
CO801-2. 3	3	3	3									

| CO801-2. 4 | 3 | 3 | 3 | 3 | | | | 2 | 2 | | 3 | 3 |
| CO801-2. 5 | 3 | 3 | 3 | 3 | | | | 2 | 2 | | 3 | 3 |

1Low 2Medium 3High

19IT8703   MULTI CORE ARCHITECTURES AND PROGRAMMING   L T P C

3 0 0 3

COURSE OBJECTIVES:

The course will enable students to:

1. Understand the challenges in parallel and multi-threaded programming.
2. Learn about the various parallel programming paradigms, and solutions.

PRERQUISITE:

  19IT3601 – Computer Organisation and Architecture

UNIT I   MULTI-CORE PROCESSORS   9

Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks - Symmetric and Distributed Shared Memory Architectures – Cache coherence - Performance   Issues   –   Parallel   program   design.

UNIT II   PARALLEL PROGRAM CHALLENGES   9

Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes).

UNIT III   SHARED MEMORY PROGRAMMING WITH OpenMP   9

OpenMP Execution Model – Memory Model – OpenMP Directives – Work-sharing Constructs - Library functions – Handling Data and Functional Parallelism – Handling Loops - Performance Considerations.

UNIT IV   DISTRIBUTED MEMORY PROGRAMMING WITH MPI   9

MPI program execution – MPI constructs – libraries – MPI send and receive – Point-to-point and Collective communication – MPI derived datatypes – Performance evaluation

UNIT V   PARALLEL PROGRAM DEVELOPMENT   9

Case studies - n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan-Kauffman/Elsevier, 2011.

2. Darryl Gove, "Multicore Application Programming for Windows, Linux, and Oracle Solaris", Pearson, 2011 (unit 2)

REFERENCE(S):

1. Michael J Quinn, "Parallel programming in C with MPI and OpenMP", Tata McGraw Hill

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO801-3. 1   Illustrate the challenges in parallel and multi threaded programming

CO801-3. 2   Explain the various parallel programming paradigms and solutions.

CO801-3. 3   Develop shared memory programs using OpenMP

CO801-3. 4   Develop Distributed memory programs using MPI

CO801-3. 5   Compare and contrast programming for serial processors and parallel processors.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO801-3. 1	3											
CO801-3. 2	3											
CO801-3. 3	3	3	3	3	3						2	2
CO801-3. 4	3	3	3	3	3						2	2
CO801-3. 5	3	3	3									

1Low 2Medium 3High

19IT8704	AGILE METHODOLOGIES AND DEVOPS	L T P C
		3 0 0 3

OBJECTIVES:

The student will be able to:

1. Understand The Differences Between Conventional And Agile Approaches

2. Estimate In An Incremental And Iterative Fashion Using Practical Techniques

3. Plan Increment Cycles

4. Apply Agile Principles To A Range Of Decision Possibilities

5. Learn Devops For CI/CD Using containers, container orchestration and pipleline

PREREQUISITE:

◻ 19IT4605 – Software Engineering Methodologies

UNIT I INTRODUCTION 9

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods- Scrum, XP, Lean, and Kanban, – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.

UNIT II AGILE PROCESSES AND REQUIREMENTS ENGINEERING 9

Lifecycle – Work Products, Roles and Practices- Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile Agile Requirements - User personas, story mapping, user stories, 3Cs, INVEST, acceptance criteria, sprints, requirements, product backlog and backlog grooming;Agile Product Development – Agile Metrics – Feature Driven Development (FDD)

UNIT III TESTING 9

Testing: Functionality Testing, UI Testing, Performance Testing, Security Testing, Tools - Selenium Agile Testing: Principles of agile testers; The agile testing quadrants, Agile automation, Test automation pyramid

UNIT V DEVOPS 9

DevOps: Continuous Integration and Continuous Delivery CI/CD: Jenkins Creating pipelines, Setting up runners Containers and container orchestration (Dockers and Kubernetes) for application development and deployment; Checking build status; Fully Automated Deployment; Continuous monitoring with Nagios; Introduction to DevOps on Cloud

TOTAL HOURS: 45

TEXT BOOK(S):

1. David J. Anderson and Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.

2. Hazza and Dubinsky, Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

3. DevOps: Continuous Delivery, Integration, and Deployment with DevOps: Dive ... By Sricharan Vadapalli, Packt, 2018

REFERENCE(S):

1. Kevin C. Desouza, Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

2. . Agile Project Management: Creating Innovative Products, Second Edition By Jim Highsmith, Addison-Wesley Professional, 2009

3. Agile Project Management: Managing for Success, By James A. Crowder, Shelli Friess, Springer 2014

4. Learning Agile: Understanding Scrum, XP, Lean, and Kanban, By Andrew Stellman, Jennifer Greene, 2015, O Reilly.

5. Agile Testing: A Practical Guide For Testers And Agile Teams, Lisa Crispin, Janet Gregory, Pearson, 2010

COURSE OUTCOMES:

CO801 – 4.1   Be able to compare and contrast the differences between Agile and other project management methodologies

CO801 – 4.2   Be able to interpret and apply various principles, phases and activities of the Scrum methodology

CO801 – 4.3   Be able to identify and use various tools for Agile development and CI/CD

CO801 – 4.4   Be able to understand Agile Testing principles for real life situations and learn the basics of SAFe for scaled agile

CO801 – 4.5   Be able to understand and implement DevOps principles for CI/CD

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO801 – 4.1	3	2	1			1						
CO801 – 4.2	3	2	1		2	1						2
CO801 – 4.3	2	2	1				3	3			1	1
CO801 – 4.4	2	2	2		3			3				3
CO801 – 4.5	2	2	2						3		1	2

1Low 2Medium 3High

19IT8705   **NATURAL LANGUAGE PROCESSING**   **L T P C**
                                                                     3 0 0 3

COURSE OBJECTIVE(S):

1. To understand the mathematical foundations needed for language processing along with the representation and processing of Morphology and Part-of Speech Taggers.
2. To understand different aspects of natural language syntax and the various methods used for processing syntax.
3. To understand different methods of disambiguating word senses.
4. To perform ambiguity resolution and generate natural language.

PRE-REQUISITE(S):

 19IT3201 - Probability & Statistics

 19IT3603 **-** Information Theory and Coding

UNIT I   INTRODUCTION   9
Natural Language Processing - Different levels of Language Analysis- Linguistics Essentials - Grammars and Parsing- Parts of Speech and Morphology -Phrase Structure Morphological Parsing-Corpus Based Work-Syntactic Processing

UNIT II   PARSING WITH FEATURES   9
Feature Systems and Augmented Grammar-Grammars for Natural Language-Viterbi Algorithm-Ambiguity Resolution

UNIT III   SEMANTICS   9
Logical form-Word senses and ambiguity-Encoding ambiguity in logical form -Defining semantic structures and semantic roles interpretation

UNIT IV   STATISTICAL WORD SENSE DISAMBIGUATION   9
Word Sense Hierarchy-Collocations -Mutual information-Selectional Restrictions-Semantic Filtering Using Selectional Restrictions-Semantic Networks-Statistical Semantic Preferences-Combining approaches to disambiguation

UNIT V   NATURAL LANGUAGE GENERATION SYSTEM   9
Introduction to Language generation-Content selection and Lexical selection-Sentence structure and Discourse Structure-Discourse Planner-Surface Realizer-Systemic Grammar-Functional Unification Grammar

TOTAL HOURS: 45

TEXT BOOK(S):

1. James Allen ―Natural Language Understanding‖, Pearson Education, 2003
2. Christopher D.Manning and Hinrich Schutze, ― Foundations of Statistical Natural Language Processing ―, MIT Press, 1999
3. Daniel Jurafsky and James H. Martin, ― Speech and Language Processing, Pearson, 2008.

REFERENCE BOOK(S):

1. Ron Cole, J.Mariani, et.al ―Survey of the State of the Art in Human Language Technology, Cambridge University press, 1997
2. Michael W. Berry, ― Survey of Text Mining: Clustering, Classification and Retrieval‖, Springer Verlag, 2003.

WEB REFERENCE(S):

1. http://ocw.mit.edu/courses
2. www.statsoft.com/Textbook/Text-Mining

COURSE OUTCOME(S):

At the end of the course, the students will be able to:

CO801-5. 1   Construct a morphological analyzer for a language of your choice using finite state automata concepts.

CO801-5. 2   Apply Construct a parser by providing suitable grammar and words.

CO801-5. 3   Construct parse tree showing the semantic interpretations for the constituents.

CO801-5. 4   Compare algorithms for word sense disambiguation.

CO801-5. 5   Construct natural language outputs from non-linguistic inputs using surface realization.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO801-5. 1	3	2	3	2								
CO801-5. 2	3	2	3									
CO801-5. 3	3	3	3	3								
CO801-5. 4	3	3	3									
CO801-5. 5	3	3	2	3								

1Low 2Medium 3High

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
PROFESSIONAL ELECTIVE – VIII
VIII SEMESTER

Code No	Course	L	T	P	C
19IT8706	Integrated Quality Management System	3	0	0	3
19IT8707	Software Project Management	3	0	0	3
19IT8708	Management Information Systems	3	0	0	3
19IT8709	Enterprise Resource Planning	3	0	0	3
19IT8710	Human Resource Management	3	0	0	3

19IT8706   INTEGRATED QUALITY MANAGEMENT SYSTEM   L T P C
3 0 0 3

COURSE OBJECTIVE(S):
1. To enhance competence in application of advanced quality tools.
2. To make students understand quality management process in the development of Electronic Engineering.

PRE-REQUISITE(S): 19IT3201 – Probability & Statistics

UNIT I   INTRODUCTION TO QUALITY MANAGEMENT SYSTEM   8

Introduction – Definition of QM – Principles- Concepts – Key elements - Barriers to QM; Quality – Quality Dimensions – Cost of Quality; Quality Gurus – TQM Framework;

UNIT II   PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT
10

Contributions of Deming‟s; Juran's Quality Trilogy & Road Map; Modern Quality Management by Armand Feigenbaum; Crosby's Absolutes of Quality Management; Quality Circleby Kaoru Ishikawa; Just in Time (JIT) by Dr. Shingo Shigea; Kaizen by Masaaki Imai; Taguchi quality loss function.

UNIT III   TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT   10

Old and New Quality control tools - Six Sigma - Business processes Benchmarking (BPB) - Business processes Reengineering; Quality function Deployment (QFD), Total Productive Maintenance (TPM), Failure Mode and Effects Analysis (FMEA), 5S Principle.

UNIT IV   CUSTOMER DRIVEN QUALITY   7

Customer driven Quality - Vision, Mission and Policy Statements – Customer focus, Needs and Requirements – Perception of quality - Customer Retention; TQM in service - Service Industry; Leadership.

UNIT V   QUALITY MANAGEMENT SYSTEMS   10

Introduction to ISO – ISO:9000 Standards– Implementation – Documentation - ISO 9004:2018 - Internal Audits - Registration; Environmental Management System: Introduction - ISO 14000 Series Standards - Concepts of ISO 14001 - Requirements of ISO 14001 - Benefits of EMS.

TOTAL HOURS : 45

TEXT BOOKS(S):

Dale H.Besterfield, Carol Besterfield – Michna, Glen H. Besterfield, Mary Besterfield – Sacre, Hermant – Urdhwareshe, RashmiUrdhwareshe, Total Quality Management, Revised Third edition, Pearson Education, 5th Edition, 2019.

REFERENCE(S):

Janakiraman. B and Gopal .R.K., "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

COURSE OUTCOMES:

CO802 – 1.1   To understand the basic concepts of TQM

CO802 – 1.2   To implement and use various philosophies in TQM

CO802 – 1.3   To describe, distinguish and use several techniques and quality management tools.

CO802 – 1.4   Focus on customer satisfaction through defined quality processes.

CO802 – 1.5   Understanding the standards and quality systems on implementation of TQM

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO802 – 1.1	2			2							3	2
CO802 – 1.2		3									3	
CO802 – 1.3	3	3	3	3	3						3	
CO802 – 1.4	3	3		3					3	3	3	
CO802 – 1.5										3	3	

1Low 2Medium 3High

19IT8707   SOFTWARE PROJECT MANAGEMENT   L T P C

3 0 0 3

COURSE OBJECTIVES:

The student should be made to:

1. To understand the Software Project Planning and Evaluation techniques.
2. To plan and manage projects at each stage of the software development life cycle (SDLC).
3. To learn about the activity planning and risk management principles.
4. To manage software projects and control software deliverables.
5. To develop skills to manage the various phases involved in project management and people management.
6. To deliver successful software projects that support organization,,s strategic goals.

PREREQUISITES:

 19IT4605 – Software Engineering Methodologies

UNIT I   PROJECT EVALUATION AND PROJECT PLANNING   9

Importance of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT II   PROJECT LIFE CYCLE AND EFFORT ESTIMATION   9

Software process and Process Models – Choice of Process models – Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and

Cost estimation techniques – COSMIC Full function points – COCOMO II – a Parametric Productivity Model.

UNIT III   ACTIVITY PLANNING AND RISK MANAGEMENT   9

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

UNIT IV   PROJECT MANAGEMENT AND CONTROL   9

Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

UNIT V   STAFFING IN SOFTWARE PROJECTS   9

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

REFERENCE(S):

1. Robert K. Wysocki ―Effective Software Project Management – Wiley Publication, 2011.
2. Walker Royce: ―Software Project Management- Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, ―Managing Global Software Projects – McGraw Hill Education (India), Fourteenth Reprint 2013.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO802-2. 1 Understand Project Management principles while developing software.

CO802-2. 2 Gain extensive knowledge about the basic project management concepts, framework and the process models. Obtain adequate knowledge about software process models and software effort estimation techniques.

CO802-2. 3 Estimate the risks involved in various project activities.

CO802-2. 4 Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.

CO802-2. 5 Learn staff selection process and the issues related to people management

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO802-2. 1	3	2								1		
CO802-2. 2	3	2	2							2		
CO802-2. 3	2	2	2	1	1					3	2	
CO802-2. 4	2	2	2	2						3	2	
CO802-2. 5				2	2	2			1	3	2	

1Low 2Medium 3High

19IT8708   MANAGEMENT INFORMATION SYSTEMS   **L T P C**

                                                        3 0 0 3

COURSE OBJECTIVES:

The course will enable students to:

1. To understand the basic principles and working of information technology
2. Describe the role of information technology and information systems in business
3. To contrast and compare how internet and other information technologies support business processes.
4. To give an overall perspective of the importance of application of internet technologies in business administration

PREREQUISITE:

    19IT3601 – Computer Organisation and Architecture

UNIT I   INFORMATION SYSTEMS IN GLOBAL BUSINESS TODAY   9

The role of information systems in business today, Perspectives on information systems, Contemporary approaches to information systems, Hands-on MIS projects. Global E-Business and Collaboration : Business process and information systems, Types of business information systems, Systems for collaboration and team work, The information systems function in business. A Case study on E business.

UNIT II   INFORMATION SYSTEMS, ORGANIZATIONS AND STRATEGY 9

Organizations and information systems, How information systems impact organization and business firms, Using information systems to gain competitive advantage, management issues, Ethical and Social issues in Information Systems: Understanding ethical and Social issues related to Information Systems, Ethics in an information society, The moral dimensions of information society. A Case study on business planning.

UNIT III   IT INFRASTRUCTURE AND EMERGING TECHNOLOGIES   9

IT infrastructure, Infrastructure components, Contemporary hardware platform trends, Contemporary software platform trends, Management issues**.** Securing Information Systems: System vulnerability and abuse, Business value of security and control, Establishing framework for security and control, Technology and tools for protecting information resources. A case study on cybercrime.

UNIT IV   ACHIEVING OPERATIONAL EXCELLENCE AND CUSTOMER
**   INTIMACY   9**

Enterprise systems, Supply chain management(SCM) systems, Customer relationship management(CRM) systems, Enterprise application. E-commerce: Digital Markets Digital Goods: E-commerce and the internet, E-commerce-business and technology, The mobile digital platform and mobile E-commerce, Building and E-commerce web site. A Case study on ERP.

UNIT V   MANAGING KNOWLEDGE   9

The knowledge management landscape, Enterprise- wide knowledge management system, Knowledge work systems, Intelligent techniques. Enhancing Decision Making: Decision making and information systems, Business intelligence in the enterprise. Business intelligence constituencies. Building Information Systems: Systems as planned organizational change, Overview of systems development.

TOTAL HOURS: 45

REFERENCE(S):

1. Kenneth C. Laudon and Jane P. Laudon: Management Information System, Managing the Digital Firm, Pearson Education, 14th Global edition, 2016, ISBN:9781292094007.

2. James A. O"Brien, George M. Marakas: Management Information Systems, Global McGraw Hill, 10th Edition, 2011, ISBN: 978-0072823110.

3. Steven Alter: Information Systems The Foundation of E-Business, Pearson Education, 4thEdition, 2002, ISBN:978-0130617736.

4. W.S. Jawadekar: Management Information Systems, Tata McGraw Hill, 2006, ISBN: 9780070616349

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO802-3. 1   Understand and apply the fundamental concepts of information systems

CO802-3. 2   Develop the knowledge about management of information systems.

CO802-3. 3   Interpret and recommend the use information technology to solve business problems.

CO802-3. 4   Apply a framework and process for aligning organization"s IT objectives with business strategy.

CO802-3. 5   Understand the role of decision making, business intelligence in information system.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO802-3. 1	2	3		2				2			2	
CO802-3. 2	2	2		2				2			2	
CO802-3. 3			3	2	2			2		2	2	
CO802-3. 4			2	2				2		2	2	
CO802-3. 5	3	3	3									

1Low 2Medium 3High

19IT8709   ENTERPRISE RESOURCE PLANNING   L T P C

3 0 0 3

OBJECTIVES:

> To know the basics of ERP
> To understand the ERP solutions and functional modules
> To know the ERP implementation
> To be aware of post implementation
> To appreciate the emerging trends on ERP

PREREQUISITE:

> 19IT4605 – Software Engineering Methodologies
>
> 19IT4601 – Data Base Systems

UNIT I   INTRODUCTION   9

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to be consider in planning design and implementation of cross functional integrated ERP systems - Case studies.

UNIT II   ERP SOLUTIONS AND FUNCTIONAL MODULES   9

Overview of ERP software solutions- Small medium and large enterprise vendor solutions, BPR, Business Engineering and best Business practices - Business process Management. Overview of ERP modules -sales and Marketing, Accounting and Finance, Materials and Production management etc. -Case studies.

UNIT III   ERP IMPLEMENTATION   9

Planning Evaluation and selection of ERP systems-Implementation life cycle - ERP implementation, Methodology and Frame work- Training – Data Migration. People Organization in implementation-Consultants, Vendors and Employees-Case studies.

UNIT IV   POST IMPLEMENTATION   9

Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of and ERP Implementation -case studies.

UNIT V   EMERGING TRENDS ON ERP   9

Extended ERP systems and ERP bolt –on -CRM, SCM, Business analytics etc- Future trends in ERP systems-web enabled, Wireless technologies so on-Case studies.

TOTAL HOURS: 45

TEXT BOOK(S):

> Alexis Leon, "ERP DEMYSTIFIED", Tata McGraw Hill, Second Edition, 2008

REFERENCE(S):

Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008

Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.

Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2006.

Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice HallofIndia,2006.

COURSE OUTCOMES:

CO801 – 4.1   Make basic use of Enterprise software, and its role in integrating business functions

CO801 – 4.2   Analyse the strategic options for ERP solutions and functional modules

CO801 – 4.3   Design the ERP implementation strategies.

CO801 – 4.4   Analyse the Post implementation.

CO801 – 4.5   Understand the various emerging trends on ERP.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO801 – 4.1	3		3	2		3						
CO801 – 4.2	3		3	3			2					
CO801 – 4.3			3	3		3						3
CO801 – 4.4	3	3	3									3
CO801 – 4.5				3	3							3

1Low 2Medium 3High

19IT8710   HUMAN RESOURCE MANAGEMENT   L T P C
3 0 0 3

COURSE OBJECTIVE(S):

1. To explore key issues related to the management, performance, and development of human resources in the workplace;

2. To emphasis on making decisions and developing plans that will enable managers to make the best possible use of their human resources;

3. To gain knowledge about manpower planning, analysis and evaluation, recruitment and selection, wages and salaries, training and management development, performance appraisal, and industrial relations

PRE-REQUISITE(S):

  ⬚ 19IT6710 – Principles of Management

UNIT I   FUNDAMENTALS OF HUMAN RESOURCE MANAGEMENT   9

Human Resource Development Systems-HR environment in India-Functions and Operations of a Personnel Office - Emerging HR Trends - HR information system

UNIT II   ROLE OF HUMAN RESOURCE MANAGER   9

Human Resource Manager Functions Job analysis and job design - HR planning – Recruitment - selection and induction- Staff Training and Development-Career planning and Development- Job Evaluation-Performance Appraisal and Potential Evaluation-Wage determination; salary structure-Wage policies and Regulations-Employee benefits and services.

UNIT III   EMPOWERMENT   9

Motivating Human Resources Team and Team work - Collective Bargaining Employee Morale – Participative anagement – Quality Circle – Empowerment –counselling and mentoring

UNIT IV   ETHICAL ISSUES IN HR MANAGEMENT   9

Maintenance of Workers Compensation Management- Reward system – Labour relations – Employee Welfare, Safety and Health – Employee benefits and services – Promotion, Transfers and separation – Ethical issues in HR Management and International Human Resource Management - Legal Aspect of Labour

UNIT V   LABOUR LAW   9

Business Law Factories Act, 1948 - Industrial Dispute Act, 1947 – Industrial employment – Standing Orders Act, 1946 – Trade Union Act, 1926 - Workmen Compensation Act, 1923, Employees State Insurance Act, 1948, Employees Provident Fund and Miscellaneous Provision Act, 1952, Payment of Gratuity Act, 1972. Payment of Wages Act 1936, Minimum wages Act, 1948– Payment of Bonus Act, 1965.Tamil Nadu Shops and Establishments Act.

TOTAL HOURS: 45

TEXT BOOK(S):

1. David A. Decenzo, Stephen P. Robbins, Susan L. Verhulst, "Human Resource Management", Wiley India, 2013(11th Edition), ISBN: 9788126553785

2. Prasad L. M, "Human Resource Management", Sultan Chand and Sons India, 2014(3rd Edition Reprint), ISBN: 9788180547690

REFERENCE BOOK(S):

1. Biswajeet Pattanayak, "Human Resource Management", PHI Learning India, 2014(4th Edition Revised), ISBN: 9788120349629

2. C. B. Gupta, "Human Resource Management: Text and Cases", Sultan Chand and Sons India, 2014(18th Edition Revised), ISBN: 9789351610977

3. V. S. P. Rao, "Human Resource Management", Excel Books India, 2010(3rd Edition), ISBN: 9788174468956

4. Frank B. Cross and Roger LeRoy Miller, "The Legal Environment of Business: Text and Cases", Cengage Learning, U.S./India, 2017(10th Edition), ISBN: 9781305967304(U.S.)

COURSE OUTCOME(S):

At the end of the course, the students will be able to:

CO801-5. 1   Demonstrate the basic knowledge on developing the employment relations and knowledge to resolve the issues.

CO801-5. 2   Design an appropriate and suitable role of HR specialist for implementing Human Resource Management policies.

CO801-5. 3   Manage the manpower to motivate and attract them to retain in the Organisation.

CO801-5. 4   Develop the skills necessary to hold responsibility of employer and legal system to manage the employment relations

CO801-5. 5   Explain the applicability of business law on various functional domains this in turn enhancing a strong human relation

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO801-5. 1	3	1	3	2								

CO801-5. 2	3	1	3	3								
CO801-5. 3			3	3								3
CO801-5. 4	3	3	3									3
CO801-5. 5				3	3							3

1Low 2Medium 3High

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PROGRAMME SPECIFIC ELECTIVE FOR EXPANDABLE SCOPE					
OPEN ELECTIVE I					
19IT5801	C Programming with Linux	3	0	0	3
19IT5802	Social Media Marketing	3	0	0	3
19IT5803	Information Technology Essentials	3	0	0	3
19IT5804	Database Programming in SQL	3	0	0	3
19IT5805	Network Technologies and protocols	3	0	0	3
OPEN ELECTIVE II					
19IT5806	Object Oriented Programming	3	0	0	3
19IT5807	Introduction to Data Analysis and Visualization with Python	3	0	0	3
19IT5808	Software Engineering practices	3	0	0	3
19IT5809	Introduction to Web Technologies	3	0	0	3
19IT5810	Cyber Security Essentials	3	0	0	3

OPEN ELECTIVE III					
19IT6801	Client server computing and applications	3	0	0	3
19IT6802	Software Testing Methodologies	3	0	0	3
19IT6803	Digital Mobile Forensics	3	0	0	3
19IT6804	Computer Aided Drug Design	3	0	0	3
19I65805	Fundamentals of IoT	3	0	0	3
OPEN ELECTIVE IV					
19IT7801	Fundamentals of Machine Learning	3	0	0	3
19IT7802	Supply Chain Technology and Systems	3	0	0	3
19IT7803	Health Care Technologies	3	0	0	3
19IT7804	Block Chain Essentials	3	0	0	3
19IT7805	Creativity and Innovation in product development	3	0	0	3

19IT5801 **C PROGRAMMING WITH LINUX** **L T P C**

3 0 0 3

OBJECTIVES:

1. To get familiarized with basic Linux commands and C Shell scripting.
2. To import the knowledge about syntaxes of tokens, Operators and Expressions in ANSI C.
3. To learn about different decision making, branching and looping concepts.
4. To learn the concepts of Array and string handling.
5. To emphasize the importance of Functions and recursions in C Programming.

UNIT I **INTRODUCTION TO LINUX** **9**

Introduction – Linux Commands: Command Formate – Directory Oriented commands - File Oriented Commands – File Access Permissions – Process Oriented Commands – Communication Oriented Commands – General Purpose Commands – VI Editor – Shell Programming – Sample Shell Scripts – The C Shell: Path Setting - Aliases - Shell Scripts.

UNIT II **TOKENS, OPERATORS AND EXPRESSIONS** **9**

Introduction, Character Set – Tokens – Keywords – Identifiers – Constants - Variable – Data Types - Declaration of Variables – Declaration of Storage Class -Assigning Values to Variables– Operators (Arithmetic, Relational, Logical, Assignment, Increment , Decrement, Conditional Bitwise, special) Expressions – Evaluation of Expressions – Type Conversions. Managing Input and Output Operations.

UNIT III **DECISION MAKING, BRANCHING AND LOOPING** **9**

Decision Making and Branching: Decision Making with IF – simple IF Statement – the IF…ELSE Statement – Nesting of IF …ELSE statements – The ELSE IF Ladder – The Switch Statement- The ?: Operator. **Decision Making and Looping:** The While statement – The Do statement – The For statement. Practical Problems.

UNIT IV **ARRAYS AND STRINGS** **9**

Introduction – One Dimensional Arrays – Two dimensional Arrays – Multi – dimensional arrays – Dynamic Arrays. Declaring and Initializing string Variables – Read Strings from Terminals – Writing Strings to screen – String Operations – String handling functions – Other Features. Practical Problems.

UNIT V   FUNCTIONS AND RECURSIONS   9

Need for User Defined Functions – A Multi Function Program – Elements of User Defined Functions – Definition of functions   -Return Values and their types – Function Calls – Function declaration – Category of Functions – No Arguments and no Return values – Arguments with Return values – No Arguments but Returns a value – Functions that Return Multiple Values – Nesting of Functions – Recursion – Passing Arrays to Functions – Passing Strings to Functions – The scope, visibility and lifetime of Variables.

TOTAL HOURS: 45

TEXT BOOK(S):

1. B Mohammed Ibrahim, "Linux A Practical Approach", Firewall Media, 2007.

2. E Balagurusamy, "Programming in ANSI C", Tata McGraw Hill Education Pvt Ltd, Fifth Edition, 2011.

REFERENCE(S):

1. Ellen Siever, Stephen Figgins, Robert Love and Arnold Robbins, "Linux in a NutShell" Oreilly, Sixth edition 2009.

2. Mark G, sobell, "A practical guide to Linux commands, Editors and Shell Programming , Prentice Hall, Second Edition,2016.

3. Yashavant Kanetkar, "ANSI C Programming", BPB Publications, Second Edition, 2019.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO505-1. 1   Identify appropriate Linux commands for the task given and solve problems using VI Editors and Shell Programming.

CO505-1. 2   Solve Arithmetic and Logical problems using Tokens, Operators and Expressions.

CO505-1. 3   Solve the engineering problems by applying the strategies of Branching and Looping in ANSI C.

CO505-1. 4   Solve problems like sorting searching, etc., by applying the concepts of Array and String Handling in ANSI C.

CO505-1. 5   Make use of Functions and Recursion in problem solving using ANSI C.

PO vs CO MAPPING

CO. No	POₐ	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO505-1. 1	2	2	2	2								

CO505-1. 2	1	1	1	1							
CO505-1. 3	2	2	2	2							
CO505-1. 4	2	2	2	2							
CO505-1. 5	1	1	1	1	1	2	2	1	2	2	

1Low 2Medium 3High

19IT5802   **SOCIAL MEDIA MARKETING**   **L T P C**

                                                                                      3 0 0 3

OBJECTIVES:

1. Explain how to develop effective social media marketing strategies for various types of industries and businesses.
2. Describe the major social media marketing portals that can be used to promote a company, brand, product, service or person.
3. Discuss the evolution of social media marketing and identify related ethical issues to communicate its impact on businesses

PRE-REQUISITES: Nil

UNIT I   UNDERSTANDING FACEBOOK AND LEVERAGING FACEBOOK FOR MARKETING   8

Introduction to basic FB terminologies-Creating a powerful personal profile for businessMarketing applications of Face book- Fundamentals of creating and maintaining fan pagesCreating groups for marketing-Face book marketing checklist.

UNIT II   INTRODUCTION TO TWITTER AS A MARKETING TOOL   10

Setting up a Twitter profile- Fundamental of Twitter: Tweet, direct messages, replies and Trending topics-Managing your Twitter experience- Fundamentals of Tweet Deck- Managing multiple Twitter accounts- Tweet management- Twitter Grader- Twitter Counter-Tweet burnerTwitter marketing checklist- Tree induction techniques.

UNIT III   FUNDAMENTALS OF YOUTUBE FOR CREATING COMPELLING ONLINE PRESENCE   10

Fundamentals of video marketing- Creating a YouTube channel- Creating your own Internet TV channel for marketing

UNIT IV   USING LINKEDIN FOR MARKETING   8

LinkedIn for B2b marketing- creating a profile in LinkedIn Powerful corporate searches and connections - Recommendations and testimonials.

UNIT IV   UNDERSTANDING CONTENT MARKETING AND USING BLOGS TO BUILD AND ENGAGE AUDIENCE   9

Basics of inbound marketing-Webinars and tele- seminars-Podcasting basics- creating blogs and building a following White papers and info graphics- Fundamentals of content duration

Total Hours: **45**

REFERENCE(S):

1. Liana Li Evans, "Social Media Marketing :Strategies for Engaging in Facebook, Twitter & Other Social Media", Que Press; Ed 2010

2. Andrew Macarthy," 500 Social Media Marketing Tips: Essential Advice, Hints and Strategy for Business: Facebook, Twitter, Pinterest, Google+, YouTube, Instagram, LinkedIn, and More!" ,Springer 2017

3. Ann Handley, "Content Rules: How to Create Killer Blogs, Podcasts, Videos, Ebooks, Webinars (and More) That Engage Customers and Ignite Your Business ", Johnwiley and sons,2012

4. Barker, "Social Media Marketing: A Strategic Approach" ,Cengage; 1 edition 2013

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO505-2. 1   Identify and describe the different social media services, tools, and platforms.

CO505-2. 2   Demonstrate understanding and evaluate new tools and social media platforms.

CO505-2. 3   Develop skills in using the predominant social media tools for business marketing.

CO505-2. 4   Discover innovative uses for social media in a variety of business areas and processes.

CO505-2. 5   Develop a strategic plan for identifying opportunities for using social media

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO505-2. 1	2	2	2	2								
CO505-2. 2	1	1	1	1								

CO505-2. 3	2	2	2	2								
CO505-2. 4	2	2	2	2								
CO505-2. 5	1	1	1	1	1	2	2	1	2	2		

1Low 2Medium 3High

19IT5803   INFORMATION TECHNOLOGY ESSENTIALS   L T P C
                                                         3 0 0 0

OBJECTIVES:

The course will enable students :

1. To introduce the concept of Internet, Networks and its working principles
2. To introduce the fundamentals of networking and mobile communication
3. To introduce various applications related to Information Technology

UNIT I   INTERNET AND WEB   9

Internet – Definition – Working of Internet – Requirement of Internet – Uses of Internet. World Wide Web: The Client Server Model – Working of a web – Web Browser – Web Server – Search Engine – Domain Name Server. Protocols: Internet Protocols, E – mail Protocols, Application Protocol

UNIT II   FUNDAMENTALS OF WEB PAGE DESIGNING   9

HTML – HTML tags – list – Working with Links – Working with Images – Working with Frames – HTML Forms – Morquees – Web Hosting – Domain Record Access.

UNIT III   NETWORKING ESSENTIALS   9

Fundamental computer network concepts - Types of computer networks - - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching – Network components

UNIT IV   MOBILE COMMUNICATION ESSENTIALS   9

Cell phone working fundamentals - Cell phone frequencies & channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies / architecture -Voice calls & SMS

UNIT V   IT APPLICATIONS AND ITS SOCIETAL IMPACT   9

IT Applications: Multimedia applications – Personal Information System – Information retrieval system – Social networking applications – Healthcare - Education. Societal Impact of IT: Impact of IT - Virus, Worms, Trojan, Malware, Spyware, Anti – virus , Spam, Cyber Crime – Hacker and Cracker

TOTAL HOURS: 45

REFERENCE(S):

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.

2. N. P. Gopalan, T. A. Adikesavan, "Web Technology: A Developer's Perspective", PHI Learning Private Limited, 2014.

3. James F. Kurose, ―Computer Networking: A Top-Down Approach‖, Sixth Edition, Pearson,2012.

4. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.

5. Peter H. Gregory, "Computer Viruses For Dummies", Second Edition, 2011.

6. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO505-3. 1   Understand the concept and working principles of Internet and Web

CO505-3. 2   Create a Web site consisting of several pages, with hyperlink navigation between the pages.

CO505-3. 3   Describe the basics of networking.

CO505-3. 4   Describe the basics of mobile communications.

CO505-3. 5   Analyze and select application suitable to create an optimal user environment.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO505-3. 1	3	2	2									
CO505-3. 2	3	2	2		3	3	3					3
CO505-3. 3	3	2	2	3								
CO505-3. 4	3	2	2	3								
CO505-3. 5	3	2	2	3	2	2	2				2	2

1Low 2Medium 3High

19IT5804	DATA BASE PROGRAMMING IN SQL	L T P C
		3 0 0 3

OBJECTIVES:

The student shall be able

1. To learn the importance of query based programming
2. To Learn the structure and methods used in queries
3. To Study the data generation, data storage and data manipulation
4. To apply advanced query patterns
5. To Learn various Database Technologies

UNIT I   INTRODUCTION   9

Database essential –Relational Database fundamentals - Database Management System (DBMS) - History of SQL – uses of SQL- Creating a Database - Data Types -Table Creation - Populating and Modifying Tables -The Bank Schema

UNIT II   QUERY MECHANICS   9

Basic Query Structure - Query Clauses – Filtering - Condition Evaluation - Building a Condition - Condition Types - Querying Multiple Tables - Subquery Types – Non-correlated Subqueries - Correlated Subqueries

UNIT III   DATA GENERATION, CONVERSION, AND MANIPULATION   9

Working with String Data, Numeric Data, Temporal Data - Conversion Functions - Grouping and Aggregates- Grouping Concepts - Aggregate Functions - Generating Groups - Group Filter Conditions - Conditional Logic - The Case Expression

UNIT IV   ADVANCED FEATURES OF SQL   9

Join - Joining Three or More Tables - Self-Joins - Join Conditions Versus Filter Conditions - Working with Sets- Set Operators - Set Operation Rules - Transactions – Transactional Control statements - Metadata- Data About Data – Information Schema - Indexes and Constraints – Database Views - Multiuser Databases

UNIT V   QUERY OPTIMIZATION   9

Query processing - Query planning – SQL joins – Sub Queries – optimization – optimization costs – SQL injection – DB connectivity – Database Drivers.

TOTAL HOURS : 45 Hours

TEXT BOOK(S):

1. Alan Beaulieu, Learning SQL, O'Reilly, 2009

REFERENCE BOOK(S):

1. Felix Alvaro, SQL: Easy SQL Programming & Database Management For Beginners, Kindle Edition,2016
2. Nathan Clark, SQL: Programming Basics for Absolute Beginners Kindle Edition, 2016

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO505-4. 1   Discuss the importance of query based programming.

CO505-4. 2   Apply various query patterns.

CO505-4. 3   Know to differentiate data generation, data storage, data manipulation Mechanisms.

CO505-4. 4   Apply advanced query patterns.

CO505-4. 5   Apply views to break down problem and enhance security and observe new technologies.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO505-4. 1	3		3				3				3	
CO505-4. 2	3		3	3		3						
CO505-4. 3			3	3								
CO505-4. 4												
CO505-4. 5							3	3				

1Low 2Medium 3High

19IT5805   NETWORKING TECHNOLOGIES AND PROTOCOLS   L T P C

3 0 0 0

OBJECTIVES:

The course will enable students:

1. To introduce the new developments in modern networking systems, high speed networks and network management protocols.

UNIT I   INTRODUCTION TO HIGH PERFORMANCE NETWORKS   9

Objectives and requirements for Quality of Service (QoS) in high performance networks. Architecture of high performance networks (HPN), design issues, protocols for HPN, VHF backbone networks, virtual interface architectures, virtual interface for networking, High-speed switching and routing - internet and PSTN IP switching techniques, SRP protocols, SRP authentication, and key exchange, comparison of TCP/IP, FTP, TELNET, queuing systems,   network   modeling   as   a   graph

UNIT II   HIGH SPEED NETWORKS: ATM   9

Frame relay: Frame relay protocols and services, frame relay congestion control. ATM: Architecture, protocol, switching, traffic and congestion control, flow control, error detection and control, traffic management, ATM service categories, ATM in LAN environment, classical IP over ATM.

UNIT III   HIGH SPEED NETWORKS: ISDN   9

ISDN: ISDN overview, interfaces and functions, physical layer, Network layer, ISDN services. B-ISDN: Driving forces and need, B-ISDN standards and services, B-ISDN Functional Architecture, B-ISDN Transmission structure, B-ISDN protocol architecture

UNIT IV   FIBER OPTICS COMMUNICATION   9

GPON (Gigabit capable Passive Optical Network), SONET/SDH and comparison with other available standards, SAN (Storage Area Networks) and Fiber Channel, DWDM, and CWDM

UNIT V   SIMPLE NETWORK MANAGEMENT PROTOCOLS   9

SNMPv1: managed networks–SNMP models– organization model–information model–SNMPv2 communication model–functional model–major changes in SNMPv2–structure of management information, MIB–SNMPv2 protocol– compatibility with SNMPv1–SNMPv3– architecture– applications–MIB security, remote monitoring–SMI and MIB–RMQN1 and RMON2.

TOTAL HOURS: 45

REFERENCE(S):

1. Andrew S. Tanenbaum, David Wetherall, "Computer Networks", Pearson Education, 2013.
2. Mani Subramanian, "Network Management: Principles and Practice" Pearson Education, Second edition, 2010.
3. Douglas E. Comer, "Computer Networks and Internets" Pearson Education, Fifth Edition, 2011
4. William Stallings, "ISDN and Broadband ISDN with Frame Relay and ATM" Pearson Education. Fourth Edition, 2002.
5. F. Halsall. "Data Communications, Computer Networks, and Open Systems" Pearson Education, Fourth Edition, 1996.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO505-5. 1   Demonstrate the knowledge of network planning and optimization

CO505-5. 2   Develop an in-depth understanding, in terms of architecture, protocols and applications, of ATM.

CO505-5. 3   Develop an in-depth understanding, in terms of architecture, protocols and applications, of ISDN.

CO505-5. 4   Develop necessary background to be able to manage projects involving any of the high-speed networking and fiber optics technologies

CO505-5. 5   Use SNMPv1, v2 and v3 protocols.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO505-5. 1	2	2	3									
CO505-5. 2		2	2	3								
CO505-5. 3			2		2	3						
CO505-5. 4								2	3	2		
CO505-5. 5	2	3	2									

1 Low 2Medium 3High

19IT5806   OBJECT ORIENTED PROGRAMMING   L T P C
                                                                    3 0 0 3

COURSE OBJECTIVES:

The course will enable students:

1. To understand Object Oriented Programming concepts and   basic characteristics of Java.
2. To know the principles of packages, inheritance and interface
3. To define exceptions and use I/O stream
4. To develop a Java application with threads and generics Classes.
5. To design and build simple Graphical User Interfaces.

UNIT I   INTRODUCTION TO OOP AND JAVA FUNDAMENTALS   9

Object Oriented Programming – Basic Concepts – The Java Environment -Basics of Java programming Structures-Classes and Objects-Constructors-Methods-Access Specifiers-Static members- Data types, Variables, Operators, Control structures including selection, Looping- Arrays-Packages-Java Doc Comments-this reference.

UNIT II   INHERITANCE AND INTERFACES   9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III   EXCEPTION HANDLING AND I/O   9

Exception Handling: exception types, nested try-catch, throw, throws and finally statements- Multithread Programming: thread creation- synchronization and priorities. Java.io, stream classes, Byte streams, character streams- serialization.

UNIT IV   MULTITHREADING AND GENERIC PROGRAMMING   9

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT V   EVENT DRIVEN PROGRAMMING   9

Graphics programming – Frame – Components – Applet event handling-parameters to applets- AWT controls- layout manager- Frames-container classes- Introduction to Java Beans- Introduction to Swing – layout management – Swing Components – Text Fields, Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

TOTAL HOURS: 45

TEXT BOOK(S):
1. Paul Deitel, Harvey Deitel, "Java SE 8 for programmer", 3rd Edition,   Pearson, 2015.
2. Cay S. Horstmann, Gary Cornell, "Core Java Volume –I Fundamentals", 9th Edition, Prentice Hall, 2013.

REFERENCE(S):
1. Herbert Schildt, "Java the complete reference", 8th Edition, McGraw Hill Education, 2011.
2. Steven Holzner, Java 2 Black book, Dreamtech press, 2011.
3. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.
4. Daniel Liang, " Introduction to Java Programming (Comprehensive Version)", Seventh Edition, Pearson 2005.

COURSE OUTCOMES

Upon completion of the course, the students will be able to:

CO506-1. 1 Understand the object oriented programming concepts and implement in java.

CO506-1. 2 Comprehend building blocks of OOPs language, inheritance, package and interfaces.

CO506-1. 3 Identify exception-handling methods.

CO506-1. 4 Implement multithreading in object oriented programs.

CO506-1. 5 Design applications with an event driven Graphical user interface.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO506-1. 1	3	1	1									
CO506-1. 2	3	3	2	1								
CO506-1. 3			3	3	1							
CO506-1. 4	1	1	2	3								
CO506-1. 5			1	2	3							

1 Low 2Medium 3High

19IT5807   INTRODUCTION TO DATA ANALYSIS AND VISUALIZATION WITH PYTHON   **L T P C**
                                                                                                                    3 0 0 3

OBJECTIVES:

The course will enable students:

1. To learn the basics of python programming
2. To learn scientific computing with python using Numpy and pandas library
3. To analyse and work on data sets.
4. To create data visualizations using python libraries

UNIT I   INTRODUCTION TO PYTHON PROGRAMMING   9

Features of Python - IDEs – Python Installation and set up Overview- Python Variables - Built-in data types - Introduction to built-in functions - Control flow statements -If, Elif, Else statements - For loops - While loops -Python functions - Built-In - data types: tuples, dictionaries, sets – List comprehensions - Indexing – Slicing .

UNIT II   NUMPY ARRAYS   9

Scientific computing using python – Numpy arrays- Creating and manipulating NumPy arrays - Computation on NumPy arrays - Sorting and Indexing NumPy arrays

UNIT III   INTRODUCTION TO PANDAS   9

Python Data Analysis Library - Pandas - Pandas data structures - Aggregating data in Pandas - Data Indexing and Selection - Logic, Control Flow and Filtering in Pandas - Grouping by for analytics - Combining datasets and Merging datasets .

UNIT II   WORKING WITH DATA SET   9

Reading data from CSV and TXT Files - Writing to CSV and TXT Files - Analyzing a file's content – Pre Processing Techniques - Handling missing data.

UNIT V   DATA VISUALIZATION   9

Visualization with Matplotlib - Line Plots, Scatter Plots and Histograms - Customizing Plots -Multiple Subplots - Density and Contour Plots – Applications of python in Data science.

TOTAL HOURS: 45

TEXT BOOKS(S):

1. Ossama Embark ,"Data Analysis and Visualization Using Python", Apress First Edition,2018
2. Allen Downey, Jeffrey Elkner, Chris Meyers, " Learning with Python " ,2015.

REFERENCE(S):

1. Allen B. Downey ,"Think Python",Second Edition,Oreilly , 2015.
2. Jake VanderPlas ,"Python Data Science Handbook", O'Reilly Media, Inc, 2015.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO506-2. 1   Understand the basics of python programming

CO506-2. 2   Apply Pandas, Numpy libraries to work with a sample dataset

CO506-2. 3   Prepare data for analysis, perform simple statistical analysis

CO506-2. 4   Create meaningful data visualizations

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO506-2. 1	3				3							
CO506-2. 2	3			2	3							

CO506-2. 3	3			2	3							2
CO506-2. 4	3	3	3	3	3							2
CO506-2. 5	3	3	3	3	3							2

1 Low 2Medium 3High

19IT5808   SOFTWARE ENGINEERING PRACTICES   L T P C
                                                       3 0 0 3

OBJECTIVES:

   The course will enable students:

   1. To understand the concepts of process, product and project development.
   2. To elucidate the knowledge of requirement analysis & to provide the knowledge of software design.
   3. To provide the knowledge of software design and testing.
   4. To introduce the project management techniques.

UNIT I   INTRODUCTION   9

Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models.

UNIT II   SOFTWARE REQUIREMENTS   9

Software requirements and specifications- Requirements elicitation- Requirements analysis modeling techniques- Functional and nonfunctional requirements- User requirements, System requirements, requirement validation and software requirement specification document.

UNIT III   ANALYSIS, DESIGN CONCEPTS AND PRINCIPLES   9

Systems Engineering - Analysis Concepts - Design Process and Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design

UNIT IV   TESTING   9

Taxonomy Of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging

UNIT V   SOFTWARE QUALITY   9

Process and Product Quality – Quality Assurance and Standards – Quality Planning and Control – Software metrics – Process Improvement – Software configuration Management.

                                                    TOTAL HOURS: 45

TEXT BOOKS(S):

1. Ian Sommerville, "Software engineering", Tenth Edition, Pearson India, 2017.
2. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Ninth Edition, McGraw-Hill International Edition, 2019.

REFERENCE(S):

1. Fairley R., "Software Engineering Concepts", Tata McGraw Hill, New Delhi, 2008.
2. Harry Hariom Choudhary , "Java Coding Standards", Amazon Kindle, USA, 2013.
3. Bernard Homes., "Fundamentals of Software Testing", Wiley & Sons, USA, 2012.
4. Watts S.Humphrey, "A Discipline for Software Engineering", Pearson Education, 2007.
5. James F.Peters and Witold Pedrycz,"Software Engineering, An Engineering Approach", Wiley-India, 2007.
6. Stephen R.Schach, " Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO506-3. 1   Analyze the software development life cycle.

CO506-3. 2   Apply the Requirement engineering process with emphasis on elicitation analysis and modelling for any given software requirement and identify appropriate design strategies and analyze the requirement specifications for any software system

CO506-3. 3   Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.

CO506-3. 4   Test and implement the software which is developed for multidisciplinary approaches.

CO506-3. 5   Identify standards, models and techniques aimed at achieving quality assurance in a variety of software development environments

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO506-3. 1	3	3	3	3								
CO506-3. 2	3	3							3			
CO506-3. 3	3	3	3	3								

CO506-3. 4	3	3	3								
CO506-3. 5	3	3	3	3	3			3			3

1 Low 2Medium 3High

19IT5809 INTRODUCTION TO WEB TECHNOLOGIES **L T P C**
3 0 0 3

COURSE OBJECTIVES:

1. To learn about website design issues and planning a website.
2. To learn about HTML and CSS for web development.
3. To learn about JavaScript and using it for Form validation
4. To learn about XML
5. To learn about PHP and SQL Databases.

UNIT I INTRODUCTION TO WWW 9

Introduction to WWW: Protocols and programs, secure connections, application and development tools, the web browser, server, choices, Dynamic IP Web Design: Web site design principles, planning the site and navigation.

UNIT II HTML AND CSS 9

Introduction to HTML, HTML tags - List, table and simple HTML forms, frames and frame sets, inside browser. Style sheets : Introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning.

UNIT III JAVASCRIPT 9

Javascript: Client side scripting, Definition, Develop JavaScript, simple JavaScript variables, functions, conditions, loops and repetition. The DOM and web browser environments, Forms and Validation.

UNIT IV XML AND TYPE SCRIPTS 9

XML : Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Well formed, using XML with application- Type Scripting – Frameworks.

UNIT V PHP AND DATA BASES 9

PHP : Basics, Arrays, function and forms, advance PHP Databases : Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs - JSON

TOTAL HOURS : 45

TEXT BOOKS(S):

1. Developing Web Application," Ralph Moseley and M. T. Savaliya", Wiley- India, 2016.
2. Principles of Web Design,"Joel Skler", Cengage Learning, 6th Edition, 2015.
3. Developing Web application in PHP," Harwani", Tata Mcgraw Hill, 2010.

REFERENCE(S):

1. Steven Holzner,"HTML 5 Black Book", Dremtech press, 2015.
2. Web Technologies, Black Book, Dreamtech Press, 2010
3. Web Applications : Concepts and Real World Design, Knuckles, Wiley-India, 2016.
4. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel Pearson, 5th Edition, 2014.
5. Programming the World wide web, " Robert Sebasta", Pearson New International Edition, Eighth Edition, 2014.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO506-4. 1   To Describe the concepts of WWW including browser and HTTP protocol.

CO506-4. 2   To list the various HTML tags and define styles using CSS pages

CO506-4. 3   To use the JavaScript to develop the dynamic web pages.

CO506-4. 4   To describe about XML and its standards

CO506-4. 5   Use server side scripting with PHP to generate the web pages dynamically using the database connectivity

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO506-4. 1	3				3				3			3
CO506-4. 2		3						3		3		
CO506-4. 3	3				3							
CO506-4. 4				3							3	
CO506-4. 5		3				3	3					3

    1Low 2Medium 3High

19IT5810   **CYBER SECURITY ESSENTIALS**   **L T P C**

                                                                 3 0 0 3

OBJECTIVES:

1. To understand the basic concepts of security threats, vulnerabilities and attacks.
2. To understand the knowledge of security in operating systems and networks.
3. To understand the usage of tools and methods used in cyber crime.
4. To.understand the security laws and standards.
5. To understand the various security management, incidents and cyber crime case studies.

PREREQUISITE:

1. Fundamentals concept of Security
2. Fundamental concept of Cyber Crime.

UNIT – I   INTRODUCTION TO SECURITY THREATS, VULNERABILITIES AND ATTACKS   9

Computer Security,   Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control and Cryptography , Web, User Side,   Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

UNIT - II   SECURITY IN OPERATING SYSTEM & NETWORKS   9

Security in Operating Systems, Security in the Design of Operating Systems, Rootkit, Network security attack, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service.

UNIT - III   TOOLS AND METHODS USED IN CYBER CRIME   9

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT – IV   SECURITY LAWS AND STANDARDS   9

Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Amendments to the Indian IT Act, Cybercrime and Punishment.

UNIT - V   SECURITY MANAGEMENT, INCIDENTS AND CYBER CRIME CASE STUDIES   9

Security Planning, Business Continuity Planning, Handling Incidents: Risk Analysis, Dealing with Disaster, Emerging Technologies, Cyber warfare, CASE STUDIES: Examples of Cyber Warfare, Financial Frauds in Cyber Domain.

TOTAL HOURS: 45

TEXT BOOK:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley Publisher, INDIA, 2012.

2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015

REFERENCE(S):

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press Publishers,   2011.
2. Introduction to Cyber Security, Chwan-Hwa (john) Wu, J. David Irwin. CRC Press Taylor & Francis   Group Publishers, 2013.

COURSE OUTCOMES:

CO1 : Identify the various security threats, vulnerabilities and attacks in cyber environment.

CO2 : Apply the various security methods in operating systems and networks.

CO3 : Identify the various tools and methods used in cyber crime.

CO4 : Gain the knowledge about the security laws and standards.

CO5 : Apply the various security management planning and handling incidents in cyber environment.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO 1	3	3	3	3								
CO 2	3	3	3	3								3
CO 3	3	3	3	3	3							3
CO 4	3							2				
CO 5	3	3	3	3								3

1Low 2Medium 3High

19IT6801   CLIENT SERVER COMPUTING AND APPLICATIONS   L T P C

3 0 0 3

COURSE OBJECTIVES:

1. To learn the basic of client / server computing.
2. To learn the open System Standards for Client/Server Computing.
3. To understand Two Tier Computing, Three-Tier Computing and Middleware.
4. To understand Multi Tier Computing, Thin Client Computing and Front End Tools.
5. To understand the concept of client-server development and learn problem solving skills through design scenarios for network environment.
6. Develop a client –server based application

UNIT I   INTRODUCTION   9

The business opportunity driving forces, major issues in information technology right sizing - review of host and non-distributed computing. Basis of distributed computing decomposition approaches layers vs tiers.Networking, Types of network, Basis of client / server computing components. Benefits, Evaluation of Client-server computing, Client / server computing approaches, applications development, cost implementation. TCP/IP Protocol suit.

UNIT II   CLIENT SERVER COMUPUTINGA ND TWO-TIER COMPUTING 9

Open system standards for client/server computing: Understanding Client / Server computing, Dispelling the Myths, Obstacles Upfront and Hidden Open system and standards, Factors for success. Socket programming and socket API.

Two tier computing: Introduction client Tier, Hardware and Software requirements operating system services, Types of Client Server -Tier, Types of Server-Eight layers of Software.

UNIT III   THREE TIER COMPUTING AND MIDDLEWARE   9

Three Tier Computing: Introduction and comparison of two and three tier- Client side, server side and middleware side, Hardware and Software requirements, Transaction servers, TP lite Vs TP Heavy. CGI scripting.

Middleware: Hardware and Software requirements, Netware connectivity, Types of Middleware, Data Base middleware Standards.

UNIT IV   MULTITIER COMPUTING AND THIN CLIENT COMPUTING   9

Multi Tier Computing: Overview, Benefits, Disadvantages, Components, Tier separations and   interaction   .

Thin client computing: Introduction to computing models – Comparison, Components, environments.

UNIT V   FRONT END TOOLS   9

Overview, the Client components, Essential features of a front end tools. Case Studies Account and Financial system, Sales automation and courseware system.

TOTAL HOURS : 45

TEXT BOOK(S):
1. Dawana Travis Dewire, "Client/Server Computing", Tata McGraw -Hill Publishing Company Limited, New Delhi, 2003.
2. Patrick Smith and Steve Guengesich, "Client/Server Computing", Prentice Hall of India,New Delhi, 2002.

REFERENCE(S):
1. Robert Orfali, Dan Harkey and Jeri Edwards, "Essential Client/Server Survival Guide", Galgotia Publications, New Delhi, 2001.
2. Joel P Kaster, "Understanding Thin Client/Server Computing", Prentice Hall of India, New Delhi,2001.
3. Jein Edwards, "3 tier Client/server at Work", Wiley Computer Publishing, USA, 1999.
4. Ashhofaiol Tomy Martin, "Building N - tier Applications with COM and VB 6.0", Wiley Computer Publishing, Singapore, 1999.
5. Travis Derive D, "Second - generation Client/Server Computing" McGraw Hill, New Delhi, 1997.
6. Karen Watterson, "Client/Server Technology for "Managers " Addition -Wesley, USA, 1996.
7. Larry J Vaughn, "Client/Server System Design and implementation", Mc Graw Hill inc, USA, 1995

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO606-1. 1	Recognize and describe the working of Computer Networks, Client server computing.
CO606-1. 2	Illustrate reference models with layers, protocols and interfaces.
CO606-1. 3	Summarize, Combine and distinguish functionalities of different Layers.
CO606-1. 4	Model the Client- Server computing using different media.

CO606-1. 5   Apply client –server computing in real life application development.

PO vs CO MAPPING

1Low 2Medium 3High

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO606-1. 1	3			3		3				3		
CO606-1. 2		3			3							
CO606-1. 3			3						3		3	
CO606-1. 4	3						3					
CO606-1. 5								3				3

19IT6802   SOFTWARE TESTING METHODOLOGIES   L T P C

3 0 0 3

COURSE OBJECTIVES:

The student should be made to

- Expose the criteria for test cases.
- Learn the design of test cases.
- Be familiar with test management and test automation techniques.
- Be exposed to test metrics and measurements.

UNIT I   INTRODUCTION   9

Testing as an Engineering Activity–Testing as Process–Testing axioms–Basic definitions – Software Testing Principles –Origins of Defects–Cost of defects–Defect Classes – The Defect Repository and Test Design–Defect Examples–Developer/Tester Support of Developing a Defect Repository – Defect Prevention strategies.

UNIT II   TEST CASE DESIGN   9

Test case Design Strategies–Using Black Box Approach to Test Case Design–Random Testing–Requirements based testing – Boundary Value Analysis–Equivalence Class Partitioning – State based testing – Cause-effect graphing -Using White Box Approach to Test design – Test Adequacy Criteria–static testing vs. Structural testing–code functional testing – Coverage and Control Flow Graphs–Covering Code Logic–Paths Testing– code complexity

UNIT III   LEVELS OF TESTING   9

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Acceptance testing – Performance testing – Regression Testing - Ad-hoc testing – Alpha, Beta Tests— Configuration testing – Compatibility testing–Website testing.

UNIT IV   TEST MANAGEMENT   9

People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items –test management – test process – Reporting Test Results – The role of three groups in Test Planning and Policy Development –Skills needed by a test specialist – Building a Testing Group.

UNIT V   TEST AUTOMATION   9

Software test automation – skill needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

TEXT BOOK(S):

1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2006.
2. Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.
3. Ilene Burnstein, "Practical Software Testing", Springer International Edition, Chennai, 2003

REFERENCE BOOK(S):

1. Boris Beizer, "Software Testing Techniques", Second Edition, Dreamtech, 2003.
2. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.
3. Glenford J. Myers, Tom Badgett, Todd M. Thomas "The Art of Software Testing" - John Wiley & Sons, Inc. ,Second Edition, 2011

COURSE OUTCOMES

Upon completion of the course, the students will be able to:

CO606-2. 1   Develop and validate a test plan.

CO606-2. 2   Design test cases suitable for a software development for different domains

CO606-2. 3   Identify suitable tests to be carried out.

CO606-2. 4   Prepare test planning based on the document, Document test plans and test cases designed.

CO606-2. 5   Use of automatic testing tools.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO606-2. 1	1	1										
CO606-2. 2		2	2						3	3	3	
CO606-2. 3		2	2	2						3	3	3
CO606-2. 4			2	2							3	3
CO606-2. 5		2	2								3	3

1Low 2Medium 3High

19IT6803   DIGITAL MOBILE FORENSICS   **L T P C**

                                                              3 0 0 3

COURSE OBJECTIVES:

1. To understand the fundamental concept and methods used for Mobile forensics.
2. To provide students with a comprehensive overview of collecting, investigating, preserving, and presenting evidence of cyber crime left in digital storage devices such as Mobile devices used for wrong-doing.
3. To Understand Android file system basics and Android Software Development kit.
4. To understand some of the Android forensic tools used for Mobile forensics.
5. To understand the internals of iOS devices.

UNIT I   INTRODUCTION TO MOBILE FORENSICS   9

Mobile forensics Mobile phone evidence extraction process, The preparation phase, The isolation phase, The processing phase, The verification phase. Practical mobile forensic approaches: Mobile operating systems overview, Mobile forensic tool leveling system, Data acquisition methods. Potential evidence stored on mobile phones, Rules of evidence.

UNIT II   WINDOWS PHONE FORENSICS   9

Windows Phone OS, Windows phone file system, Data acquisition, Extracting the data.
Case Study: BlackBerry Forensics

UNIT III   UNDERSTANDING ANDROID   9

The Android model, Android security, Android file hierarchy, Android file system. A forensic environment setup - Android Software Development Kit, Android Virtual Device, Accessing the connected device, Android Debug Bridge. Accessing the device using adb - Detecting connected devices, Killing the local adb server, Accessing the adb shell. Screen lock bypassing techniques, Gaining root access.

UNIT IV   ANDROID DATA RECOVERY TECHNIQUES AND FORENSIC
**   TOOLS   9**

Android App Analysis and Overview of Forensic Tools: Android app analysis, Reverse engineering Android apps, Forensic tools overview, Cellebrite – UFED, MOBILedit. CASE STUDY: Android Data Extraction Techniques

UNIT V   UNDERSTANDING THE INTERNALS OF IOS DEVICES   9

iPad hardware, File system, The HFS Plus file system. iPhone operating system. iOS security. Data Acquisition from iOS Devices: Operating modes of iOS devices, Physical acquisition, Acquisition via a custom ramdisk. Building a custom ramdisk, Booting the custom ramdisk, Bypassing the passcode, Imaging the data partition, Decrypting the data partition, Recovering the deleted data. CASE STUDY: iOS Forensic Tools.

                                        TOTAL HOURS: 45

TEXT BOOK(S):

1. Practical Mobile Forensics, Satish Bommisetty, Rohit Tamma, Heather Mahalik, Packt Publishing Ltd, 2014.

REFERENCE BOOK(S):

1. Android Forensics: Investigation, Analysis and Mobile Security for Google Android by Andrew Hoog, Elsevier publication, 2011
2. Mobile forensic investigations : a guide to evidence collection, analysis, and presentation, Reiber & Lee, Mcgraw Hill Publisher, 2016

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO606-3. 1   Understand the basic concepts of Mobile Forensics.

CO606-3. 2   Understand the basic concepts of Windows Phone Forensics.

CO606-3. 3   Understand the basic concepts of Android file system and Security.

CO606-3. 4   Identify the Android Data Recovery Techniques and Forensic Tools.

CO606-3. 5   Understand the Concept of Internals of iOS Devices.

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO606-3. 1	3				3				3			3
CO606-3. 2		3						3		3		
CO606-3. 3	3					3						
CO606-3. 4				3							3	
CO606-3. 5		3				3		3				3

1Low 2Medium 3High

19IT6804   COMPUTER AIDED DRUG DESIGN   L T P C
                                                         3 0 0 3

OBJECTIVES:

1. To gain knowledge about fundamental concepts, challenges, and rich opportunities in developing and applying algorithms for structural bioinformatics.
2. To interpret and practice the fundamental concepts of Molecular Modeling and Computer aided Drug Design.
3. To impart knowledge and skills in Molecular docking.
4. To develop practical skills in computational approaches to analyze, predict, and engineer biomolecules and biomolecular systems.

PREREQUISITE:

Prior knowledge of bioinformatics, computational biology, Statistical computational methods.

UNIT I   INTRODUCTION TO COMPUTER AIDED DRUG DESIGN   9

Concepts and Principles in CADD , Protein – ligand docking, structural - Virtual Screening - Molecular Dynamics - Pharmacophore generation - Advanced concepts in Structural Bioinformatics – Homology modelling: concepts, principles and application

UNIT II   MODELING AND SIMULATION   9

Drug Discovery – components – process – Perspectives – Numeric considerations – Algorithms

– Hardware – Issues – Protein structure – AbInitio Methods – Heuristic methods – Systems

Biology – Tools – Collaboration and Communications – standards -Issues – Security –

Intellectual property.

UNIT III   MOLECULAR MODELING   9

Automated methods of conformational search - Advantages and limitations of available software - Molecular graphics - Computer methodologies behind molecular modelling - artificial intelligence methods.

UNIT IV   MOLECULAR DOCKING   9

Rigid docking, flexible docking, manual docking - Advantages and disadvantages of Flex-X, Flex-S, Autodock and Dock softwares - Dynamics of drugs -Monte Carlo simulations and Molecular dynamics in performing conformational search and docking.

UNIT V   CASE STUDIES   9

Overview on Protein Data Bank - Ligand databases - step by step tutorial on Protein-Ligand Docking Tool using AutoDock4 - Analysing the interaction.

TOTAL HOURS: 45

 TEXT BOOKS

1. Andrew R. Leach, Molecular Modelling Principle and Application, 2nd Edition, Prentice Hall, England,2001.

2. Paul S. Charifson, Practical Applications of computer aided drug design, 1st Edition, Marcel Dekker, New York, 1997.

3. Bergeron, Bryan P. Bioinformatics computing. Prentice Hall Professional, 2003.

4. Advanced Concepts in Structural Bioinformatics: Structural Bioinformatics: Philip E. Bourne (Editor), HelgeWeissig (Editor). ISBN: 978-0-471-20199-1

REFERENCES

1. Bal H. P. Bioinformatics: Principles and Applications. Tata McGraw-Hill, 2005.

2. Computer-aided Drug Design: Practical Application of Computer-Aided Drug Design (Hardcover) by Charifson (Author)

3. Computer-Aided Drug Design. Methods and Applications. Edited by Thomas J. Perun and C. L. Propst Marcel Dekker

COURSE OUTCOMES:

CO303. 1   Understand fundamental concepts in bioinformatics and theoretical basis of Computational Biology

CO303. 2   Implement computational advancement in drug discovery process

CO303. 3   Understand the importance of protein ligand docking in drug discovery applications

CO303. 4   Understand to apply docking tools for drug discovery process.

CO303.5   Understand the importance of advanced computational techniques for drug discovery

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO303. 1	3	1	3	2								
CO303. 2	3	1	3	3								
CO303. 3			3	3								3
CO303. 4	3	3	3									3
CO303. 5				3	3							3

1Low 2Medium 3High

19IT6805   FUNDAMENTALS OF IOT   **L T P C**
                                                                        3 0 0 3

COURSE OBJECTIVES:

1. To understand the fundamentals of Internet of Things

2. To study about various IOT Architectures.

3. To learn about various IOT-related protocols.

4. To build simple IoT Systems using Arduino and Raspberry Pi.

5. To develop IoT infrastructure for popular applications

UNIT I   FUNDAMENTALS OF IOT   9

Evolution of Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology

UNIT II   IOT ARCHTECTURE   9

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture- Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT III   IOT PROTOCOLS   9

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4– Zigbee Architecture – Network layer– Security-Application Layer Protocols: CoAP and MQTT

UNIT IV   BUILDING IoT WITH RASPBERRY PI & ARDUINO   9

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

UNIT V   CASE STUDIES/INDUSTRIAL APPLICATIONS   9

Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

TOTAL HOURS: 45

TEXTBOOK(S):

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

REFERENCE(S):

1. Arshdeep Bahga, Vijay Madisetti, ―Internet of Things – A hands-on approach, Universities   Press,   2015

2. Olivier Hersent, David Boswarthick, Omar Elloumi, ―The Internet of Things – Key applications and Protocols‖, Wiley, 2012 (for Unit 2).

3. Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, StefanAvesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.

4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―"Architecting the Internet of Things", Springer, 2011.

5. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and EnhanceYour Projects, 2 nd Edition, O'Reilly Media, 2011.

6. Honbo Zhou, ―The Internet of Things in the Cloud: A Middleware Perspective‖, CRC Press, 2012.

WEB REFERENCES:

1. https://www.arduino.cc/

2. https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

CO606-5. 1	Explain the concept of IoT.
CO606-5. 2	Analyze various architectures for IoT.
CO606-5. 3	Analyze various protocols for IoT
CO606-5. 4	Design a PoC of an IoT system using Raspberry Pi/Arduino
CO606-5. 5	Analyze applications of IoT in real time scenario

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO606-5. 1	3	1	1	1								
CO606-5. 2	1	3	2	1								
CO606-5. 3			3	3								
CO606-5. 4	1	1	1	3								
CO606-5. 5			1	2	3							

1Low 2Medium 3High

19IT7801   FUNDAMENTALS OF MACHINE LEARNING   L T P C

3 0 0 3

OBJECTIVES

- To introduce students to the basic concepts and techniques of Machine Learning.
- To Understand the concept behind artificial neural networks for learning non-linear functions.
- To become familiar with algorithms for learning Bayesian networks
- To learn, conceptualize and apply genetic algorithms
- To learn, understand and practice machine learning techniques focusing on modern industrial applications.

PREREQUISITE:

- Artificial Intelligence, Predictive Analytics and Data Mining

UNIT 1- INTRODUCTION

Designing a Learning system – Perspectives and issues in machine learning – Concept learning – General to specific ordering - Finding a maximally specific hypothesis- Candidate elimination algorithm - List- then-eliminate algorithm

UNIT – II UNSUPERVISED LEARNING

Clustering – Principle - Partition Based Clustering – K means Clustering Algorithm – Numerical Example – K medoid clustering Algorithm – Hierarchical Clustering – Agglomerative Clustering and Divisive Clustering – Application of k means clustering on Crime data set

UNIT III – SUPERVISED LEARNING

Bayesian Learning : Bayes Theorem and concept learning – Maximum likelihood and Least squared error hypothesis -Naïve Bayes classifier – Bayesian Belief Networks – Conditional independence – Representation – Inference – Learning Bayesian Belief Networks – Application of Naïve Bayes classifier on Iris data set

UNIT IV – DECISION TREE LEARNING

Introduction – Decision Tree Representation – Appropriate problems for decision tree learning   –

Attribute selection - Basic decision tree learning algorithm – Issues in decision tree learning – overfitting – missing attributes – Application of decision tree on healthcare data set

UNIT V – ENGINEERING APPLICATIONS AND CASE STUDIES

Introduction to ML applications in Engineering – Civil Engineering : Natural disaster prediction, Transport data analysis - Mechanical Engineering: IoT and onsite performance analysis, Electrical Engineering :Load balancing, power distribution, control and feedback systems - Electronics Engineering : Pattern recognition - Information Technology : Data science, Recommendation systems

TEXT BOOKS

1. Mitchell Tomm, Machine Learning. Tata McGraw Hill Education Pvt Limited, Revised Indian Reprint, 2013.

2. Mohsenn Mohammed, Muhammad Badrudding Khan, Mohammed Basheir E.B, Machine Learning algorithms and applications, Taylor & Francis, 2016

REFERENCES

1. Christopher M. Bishop. Pattern Recognition and Machine Learning, Springer 2007.
2. S. Haykin. Neural networks and learning machines. Pearson 2008
3. T.Hastie, R.Tibshirani and J.Friedman. The Elements of Statistical Learning. Springer 2011

Upon completion of the course, the students will be able to:

CO705-1.1   Gain knowledge about basic concepts of Machine Learning

CO705-1.2   Understand Artificial neural network and instance based learning

CO705-1.3   Ability to select and implement supervised machine learning techniques such as Bayesian classifiers and Bayesian belief networks

CO705-1.4   Understand genetic algorithm and its applications

CO705-1.5   Identify machine learning techniques suitable for a given problem and solve the problems using various machine learning techniques

PO Vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO705-1.1	3	3			3							2
CO705-1.2	3	3	2	2	2							2

CO705-1.3	3	3	2	2								
CO705-1.4	3	3	2									
CO705-1.5	3	3	3									3

1Low 2Medium 3High

19IT7802   SUPPLY CHAIN TECHNOLOGY AND SYSTEMS   L T P C
3 0 0 3

OBJECTIVE:

1. To understand fundamental supply chain management concepts.
2. To provide an insight on the fundamentals of supply chain networks, tools and techniques.
3. To learn the supply dynamics and flows.
4. To apply the IT concepts for managing an effective supply chain system.

UNIT I   INTRODUCTION   9

Role of Logistics and Supply chain Management: Scope and Importance- Evolution of Supply Chain - Decision Phases in Supply Chain - Competitive and Supply chain Strategies – Bull whip effect Drivers of Supply Chain Performance and Obstacles – Make versus Buy.

UNIT II   SUPPLY CHAIN NETWORK DESIGN   9

Role of Distribution in Supply Chain – Factors influencing Distribution network design – Design options for Distribution Network Distribution Network in Practice-Role of network Design in Supply Chain – Framework for network Decision – Demand Forecasting.

UNIT III   SUPPLY CHAIN DYNAMICS   9

Inventory Management - Role of transportation in supply chain – factors affecting transportations decision – Design option for transportation network – Tailored transportation – Routing and scheduling in transportation - Role of sourcing supply chain supplier selection assessment and contracts – Types of Supply chain Contracts.

UNIT IV   SUPPLY CHAIN AND INFORMATION TECHNOLOGY   9

Introduction - Enabling Supply Chain Management Through Information Technology - IT in Supply Chain Transaction Execution - IT in Supply Chain Collaboration and Coordination - IT in Supply Chain Decision Support - IT in Supply Chain Measurement and Reporting - Strategic Management Framework for IT Adoption in Supply Chain Management - Supply Chain Management Application Marketplace - Future Trends-Business in supply chain

UNIT V   SUPPLY CHAIN SYSTEMS   9

Supply Chain Information System - Supply chain Integration – Internal & External Integration – Supply chain restructuring – Agile Supply chain – E-SCM - Enterprise application integration and supply chain visibility – Decision support system – Supply chain analytics.

TOTAL HOURS: 45

TEXTBOOK(S):

1. Sunil Chopra, Peter Meindl, Supply Chain Management: Strategy, Planning, and Operation, Pearson 6th Edition, 2016.

REFERENCE(S):

1. Janat Shah, Supply Chain Management, Pearson Education India, 2nd Edition ,2016.

2. Srinivasan G.S, "Quantitative models in Operations and Supply Chain Management, PHI, 2010

3. Paul Schönsleben, Integral Logistics Management: Planning and Control of Comprehensive Supply, ACRC Press Company, 2016.

4. James B.Ayers, "Handbook of Supply Chain Management", St.Lucle press, 2000.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO705-2.1   Gain knowledge about basic concepts of Machine Learning

CO705-2.2   Understand Artificial neural network and instance based learning

CO705-2.3   Ability to select and implement supervised machine learning techniques such as Bayesian classifiers and Bayesian belief networks

CO705-2.4   Understand genetic algorithm and its applications

CO705-2.5   Identify machine learning techniques suitable for a given problem and solve the problems using various machine learning techniques

PO Vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO705-2.1	2					2		1			3	
CO705-2.2											2	
CO705-2.3					2						3	
CO705-2.4	2		2		3					1	3	
CO705-2.5	2		2		3				2	2	3	

1Low 2Medium 3High

19IT7803   HEALTH CARE TECHNOLOGIES   **L T P C**

                                                            3 0 0 3

COURSE OBJECTIVES:

1. To understand information systems, medical technology and support systems used in the healthcare continuum.
2. To identify major trends in healthcare information and healthcare technology.
3. To discuss individual and organizations with healthcare technology used within this region and nationally.
4. To explain future opportunities and challenges in health industry information systems, technology and support systems.
5. To explore the impact technology has on the delivery of services
6. To identify current uses of information technology in administrative, clinical, decision support and ancillary services

UNIT I   INTRODUCTION TO TELEMEDICINE IN HEALTH CARE   9

History and Evolution of telemedicine, Functional diagram of telemedicine system, Telemedicine, Tele health, Tele care, Organs of telemedicine, Global and Indian scenario, Ethical and legal aspects of Telemedicine - Confidentiality, Social and legal issues, Safety and regulatory issues, Advances in Telemedicine.

UNIT II   TECHNOLOGY FOR TELEMEDICINE IN HEALTH CARE   9

Principles of Multimedia - Text, Audio, Video, data, Data communications and networks, PSTN, POTS, ANT, ISDN, Internet, Air/ wireless communications: GSM satellite, and Micro wave, Modulation techniques, Types of Antenna, Integration and operational issues, Communication infrastructure for telemedicine – LAN and WAN technology. Satellite communication. Mobile hand held devices and mobile communication. Internet technology and telemedicine using world wide web (www). Video and audio conferencing. Clinical data –local and centralized.

UNIT III   STANDARDS FOR TELEMEDICINE IN HEALTH CARE   9

Data Security and Standards: Encryption, Cryptography, Mechanisms of encryption, phases of Encryption. Protocols: TCP/IP, ISO-OSI, Standards to followed DICOM, HL7, H. 320 series (Video phone based ISBN) T. 120, H.324 (Video phone based PSTN), Video Conferencing, Realtime Telemedicine integrating doctors / Hospitals, Clinical laboratory data, Radiological data, and other clinically significant biomedical data, Administration of centralized medical data, security and confidentially of medical records and access control, Cyber   laws   related   to   telemedicine.

UNIT IV   MOBILE TELEMEDICINE IN HEALTH CARE   9

Tele radiology: Definition, Basic parts of teleradiology system: Image Acquisition system Display system, Tele pathology, multimedia databases, color images of sufficient resolution, Dynamic range, spatial resolution, compression methods, Interactive control of color, Medical information storage and management for telemedicine- patient information medical history, test reports, medical images diagnosis and treatment. Hospital information system - Doctors, paramedics, facilities available. Pharmaceutical information system.

UNIT V   TELEMEDICAL APPLICATIONS IN HEALTH CARE   9

Telemedicine access to health care services – health education and self-care. · Introduction to robotics surgery, telesurgery. Telecardiology, Teleoncology, Telemedicine in neurosciences, Electronic Documentation, e-health services security and interoperability., Telemedicine access to health care services– health education and self-care, Business aspects - Project planning and costing, Usage of telemedicine

TOTAL HOURS: 45

TEXT BOOK(S):

1. Bernard Fong, A.C.M. Fong, C.K. Li, Telemedicine Technologies: Information Technologies in Medicine and Telehealth, wiley, 2011.

2. Bemmel, J.H. van, Musen, M.A. (Eds.) (1997). Handbook of Medical Informatics. Heidelberg, Germany: Springer. (ISBN 3-540-63351-0).

3. Ferrer-Roca, O., Sosa-Iudicissa, M. (editors), Handbook of Telemedicine. IOS Press (Studies in Health Technology and Informatics, Volume 54). (ISBN 90-5199-413-3), 2002.

REFERENCE(S):

1. Magnuson, J.A., Fu, Jr., Paul C. (Eds.), Public Health Informatics and Information systems, ISBN 978-1-4471-4237-9, Springer, 2014.

2. Norris, A.C. Essentials of Telemedicine and Telecare. Wiley (ISBN 0-471-53151-0), 2002.

3. Wootton, R., Craig, J., Patterson, V. (Eds.), Introduction to Telemedicine. Royal Society of Medicine Press Ltd (ISBN 1853156779), 2006.

4. Carroll, P.W., Yasnoff, W.A., Ward, E., Ripp, L.H., Martin, E.L. (Eds), Public Health Informatics and Information Systems. Springer (ISBN 0-387-95474-0), 2003.

5. Simpson, W. 2006. Video over IP. A practical guide to technology and applications. Focal Press (Elsevier). ISBN-10: 0-240-80557-7.

6. Teresa L. Thompson, Roxanne Parrott, Jon F. Nussbaum, TheRoutledge Handbook of Health Communication, Routledge, 2011.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO705-3.1 Students are exposed to the Technologies applied in multimedia using telemedicine,

CO705-3.2   Analyze the aspect of technology impacting healthcare

CO705-3.3   Protocols behind encryption techniques for secure transmission of data.

CO705-3.4 Familiar with healthcare and medical terminology

CO705-3.5 Expertise in healthcare technological research and implement telehealth in healthcare

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO705-3.1	3	1	3	2								
CO705-3.2	3	1	3	3								
CO705-3.3			3	3								
CO705-3.4	3	3	3									
CO705-3.5				3	3							

1Low 2Medium 3High

19IT7804   **BLOCK CHAIN ESSENTIALS**   **L T P C**

3 0 0 3

COURSE OBJECTIVES:

1. To learn about the decentralization approach in BITCOIN.
2. To elaborate on the models available for Block chain.
3. To learn about the cryptographic mechanisms used in Crypto currency.
4. To experiment different attacks in Ethereum.
5. To learn the recent trends in Block chain Technology.

UNIT I   BITCOIN: THE DECENTRALIZATION APPROACH   9

The consensus problem - Asynchronous Byzantine Agreement - AAP protocol and its analysis - Nakamoto Consensus on permission-less, nameless, peer-to-peer network.

UNIT II ABSTRACT MODELS FOR BLOCKCHAIN 9

GARAY model - RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW+PoS).

UNIT III CRYPTOGRAPHY FOR CRYPTOCURRENCY AND BIT COIN 9

Overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography. Bitcoin - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin.

UNIT IV ETHEREUM 9

Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts.

UNIT V CASE STUDIES 9

Block Chain applications - Finance & Banking – Educational Institutions – PharmaCeutical –Supply chain – Business innovations- Walmart – Hyperledger.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, "Bitcoin and cryptocurrency technologies: a Comprehensive Introduction", Princeton University Press, 2016.

REFERENCE(S):

1. Joseph Bonneau et al, "SoK: Research perspectives and challenges for Bitcoin and cryptocurrency", IEEE Symposium on security and Privacy, 2015.

2. J.A.Garay et al, The bitcoin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310. (eprint.iacr.org/2016/1048).

3. R.Pass et al, "Analysis of Blockchain protocol in Asynchronous networks", EUROCRYPT 2017. (eprint.iacr.org/2016/454).

4. R.Pass et al, "Fruitchain, a fair blockchain", PODC 2017 (eprint.iacr.org/2016/916).

COURSE OUTCOMES:

CO705-4.1   Familiarize the functional/operational aspects of crypto currency ECOSYSTEM.

CO705-4.2   Understand emerging abstract models for Block chain Technology.

CO705-4.3 Identify major technical gaps existing between theory and practice in crypto currency domain

CO705-4.4 Generate different types of attacks on smart contracts in Ethereum platform.

CO705-4.5 Apply the knowledge of recent trends in real time applications.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO705-4.1	3	2				2		2				
CO705-4.2	2	3	2	3	1			3				
CO705-4.3	2	3	3	3								
CO705-4.4	2	2	3		3	3		3				3
CO705-4.5	2	3	2					3				3

1Low 2Medium 3High

19IT7805   CREATIVITY AND INNOVATION IN PRODUCT DEVELOPMENT

L T P C

3 0 0 3

OBJECTIVES:

1. To impart the introduction about creativity and innovation.
2. To learn about ideas of project selection and Evaluation.
3. To have an insight about new product development.
4. To learn about developing a prototype and test its quality.
5. To learn about developing a standard model, evaluate it and file a patent.

UNIT I   INTRODUCTION   9

The process of technological innovation - factors contributing to successful technological innovation - the need for creativity and innovation - creativity and problem solving - brain storming - different techniques

UNIT II   PROJECT SELECTION AND EVALUATION   9

Collection of ideas and purpose of project - Selection criteria - screening ideas for new products (evaluation techniques)

UNIT III   NEW PRODUCT DEVELOPMENT   9

Research and new product development - Patents - Patent search - Patent laws - International code for patents - Intellectual property rights (IPR).

UNIT IV   NEW PRODUCT PLANNING   9

Design of proto type - testing - quality standards - marketing research introducing new products

UNIT V   MODEL PREPARATION AND EVALUATION   9

Creative design - Model Preparation - Testing - Cost evaluation – Patent application

TOTAL HOURS : 45

TEXT BOOKS(S):

1. Twiss, Brian. "Managing Technological Innovation", Pitman Publishing Ltd., 1992.
2. Watton, Harry B. "New Product Planning", Prentice Hall Inc., 1992.

REFERENCE(S):

1. Nystrom, Harry "Creativity and Innovation", John Wiley & Sons, 1979.
2. Khandwalla, N. – "Fourth Eye (Excellence through Creativity) - Wheeler Publishing", 1992.
3. I.P.R. Bulletins, TIFAC, New Delhi, 1997.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO705-5.1   Understand the various issues related to creativity and the various factors affecting innovation

CO705-5.2   Understand the various screening ideas of project

CO705-5.3   Understand the various laws in patent and IPR

CO705-5.4   Understand about the prototype building and market research.

CO705-5.5   Understand the design and evaluation and filing an application for patent.

PO vs CO MAPPING

CO. No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO705-5.1	3			3		3				3		
CO705-5.2		3			3							
CO705-5.3			3						3		3	
CO705-5.4	3						3					
CO705-5.5								3				3

1Low 2Medium 3High

VALUE ADDED COURSE

Course Code	Course Name	L	T	P	C
VAC4001	Fundamentals of Computational Thinking and Coding	1	0	0	2
VAC4002	Fundamentals of Data analysis and Visualization Using Python	1	0	0	2

VAC4001   FUNDAMENTALS OF COMPUTATIONAL THINKING AND CODING

L T P C

1 0 2 2

OBJECTIVES:

The course will enable students:

1. To learn the basics of problem solving and algorithmic thinking techniques.
2. To understand and analyze the problem.
3. To apply concepts to develop solutions to a variety of practical problems.
4. To develop programs using problem solving techniques.
5. To develop a mini project.

UNIT I   Introduction to Computational Thinking   4

Introduction – Decomposition - Pattern Recognition - Data Representation and   Abstraction – Algorithms - Case Studies

UNIT II   Arithmetic & logical problems and drills   4

Numbers – pattern printing –sequences - looping constructs – optimization.

UNIT III   Working with Arrays and Strings   4

Array processing – string processing – pattern printing

UNIT IV   Working with Date and Time and Simple Games   8

Dates and Time, Simple Games: Number Guess – Random number

UNIT V   Organizing data and processing, expressing and Analyzing Algorithms 10

Choosing a suitable data structure – organizing data – processing.

Finding the Largest Value- Linear Search - Algorithmic Complexity - Binary Search -Brute Force Algorithms - Greedy Algorithms - Case Studies

Code Optimization   5

Mini project   5

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

1	Understand the algorithmic thinking concepts.
2	Analyze the problem with algorithmic thinking.
3	Understand the various problem solving strategies.
4	Develop programs using appropriate problem solving strategy
5	Develop Mini project / Model

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
1	3				3							
2	3			2	3							
3	3			2	3							2
4	3	3	3	3	3							2
5	3	3	3	3	3							2

1 →Low 2→Medium 3→High

REFERENCE(S):

1. Karl Beecher, "Computational Thinking: A beginner's guide to problem-solving and programming", BCS, The Chartered Institute for IT; 1st edition (7 September 2017).

WEB REFERENCES(S):

1. https://teachinglondoncomputing.org/resources/developing-computational   thinking/algorithmic-thinking/

VAC4002 FUNDAMENTALS OF DATA ANALYSIS AND VISUALIZATION USING PYTHON

L T P C

1 0 2 2

OBJECTIVES:

The course will enable students:

1. To learn the basics of python programming

2. To learn scientific computing with python using Numpy and pandas library

3. To analyse and work on data sets.

4. To create data visualizations using python libraries

5. To develop a mini project / Model

INTRODUCTION TO PYTHON PROGRAMMING   3

Features of Python - IDEs – Python Installation and set up Overview-CoLab - Python Variables - Built-in data types - Introduction to built-in functions - Control flow statements -If, Elif, Else statements - For

loops - While loops -Python functions - Built-In - data types: tuples, dictionaries, sets – List comprehensions - Indexing – Slicing

NUMPY ARRAYS   8

Scientific computing using python – Numpy arrays- Creating and manipulating NumPy arrays - Computation on NumPy arrays - Sorting and Indexing NumPy arrays

INTRODUCTION TO PANDAS   7

Python Data Analysis Library - Pandas - Pandas data structures - Aggregating data in Pandas - Data Indexing and Selection - Logic, Control Flow and Filtering in Pandas - Grouping by for analytics – case studies.

IMPORTING DATA SET   6

Reading data from CSV and TXT Files - Writing to CSV and TXT Files - Analyzing a file's content – Pre Processing Techniques –Data Wrangling - Handling missing data- Combining datasets and Merging datasets – case studies.

DATA VISUALIZATION   6

Visualization with Matplotlib - Line Plots, Scatter Plots and Histograms - Customizing Plots -Multiple Subplots - Density and Contour Plots – Applications of python in Data science – CASE studies .

MINI PROJECT   5

TOTAL HOURS: 35

TEXT BOOKS(S):

1. Ossama Embark ,"Data Analysis and Visualization Using Python", Apress First Edition,2018
2. Allen Downey, Jeffrey Elkner, Chris Meyers, " Learning with Python " ,2015.

REFERENCE(S):

1. Allen B. Downey ,"Think Python",SecondEdition,Oreilly , 2015.
2. Jake VanderPlas ,"Python Data Science Handbook", O'Reilly Media, Inc, 2015.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

1	Understand the basics of python programming
2	Apply Pandas, Numpy libraries to work with a sample dataset
3	Prepare data for analysis, perform simple statistical analysis
4	Create meaningful data visualizations
5	Develop Mini project / Model

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
1	3				3							
2	3			2	3							
3	3			2	3							2
4	3	3	3	3	3							2
5	3	3	3	3	3							2

1 →Low 2→Medium 3→High

HONOURS DEGREE – DATA SCIENCE
List of Courses

Course Code	SEMESTER	Course Name	L	T	P	C
19IT5S001	V	FUNDAMENTALS OF DATA SCIENCE	3	0	0	3
19IT5S002	V	DATA MINING USING R	3	0	1	4
19IT6S003	VI	DATA WRANGLING	3	0	0	3
19IT7S004	VII	DATA VISUALIZATION FOR ENGINEERS	3	0	1	4
19IT8S005	VIII	BUSINESS INTELLIGENCE AND ANALYTICS	3	0	0	3

19IT5S001   **FUNDAMENTALS OF DATA SCIENCE**   **L T P C**

                                                            3 0 0 3

Course Objective:

The objective of this course is

- To provide overview on mathematical principles and techniques needed for modern data analysis.

- To introduce key conceptual techniques for data analysis such as linear regression, Principal component analysis, Bayesian inferences etc.,

- To understand the life cycle of Data Science and computational environments for data scientists using Python.

- To describe the fundamentals for exploring and manipulating data with Python

PREREQUISITE: Fundamental of Mathematics.

UNIT I   **PROBABILITY AND LINEAR ALGEBRA**   **9**   Conditional

Probability and independence – Density functions – Expected value – Variance –conditional distribution- Bayes' rule- Bayesian Inference – Convergence and sampling : Estimation – Concentration of measure - Linear algebra review – Vectors – Matrices – Norms – Linear Independence – Rank – Inverse – Orthogonality.

UNIT II   **APPLIED MATHEMATICS FOR DATA SCIENCE**   **9**

Metrics – Lp distances - Mahalanobis distance – Cosine and angular distance – KL divergence – Distances for sets and strings – Similarities – Linear regression: Simple linear regression, Multiple explanatory variables, Polynomial regression, Cross validation, Regularized regression, Principal Component Analysis, Markov Chains

UNIT III   **INTRODUCTION TO DATA SCIENCE**   **9**

Introduction to Data Science and its importance - Data Science and Big data-, The life cycle of Data

Science- The Art of Data Science - Work with data – data Cleaning, data Munging, data manipulation. Establishing computational environments for data scientists using Python with IPython and Jupyter.

UNIT IV   DATA EXPLORATION USING NUMPY   9

Understanding Data Types in Python - The Basics of NumPy Arrays - Computation on NumPy Arrays: Universal Functions - Aggregations: Min, Max, and Everything in Between Computation on Arrays: Broadcasting-Comparisons, Masks, and Boolean Logic Fancy Indexing-Sorting Arrays.

UNIT V   DATA MANIPULATION USING PANDAS   9

Installing and Using Pandas, Introducing Pandas Objects,Data Indexing and Selection. Operating on Data in Pandas,Handling Missing Data, Hierarchical Indexing Combining Datasets: Concat and Append, Combining Datasets: Merge and Join. Aggregation and Grouping, Pivot Tables, Vectorized String Operations, Working with Time Series.

Total : 45 hours

Text Book:

1. Jeff M. Philips, "Mathematical Foundations for Data Analysis",Springer series in data sciences, Revised edition, 2021

2. Python Data Science Handbook-Essential Tools for Working with Data, Jake Vander Plas, O'Reilly Media,2016.

3. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly,2015

Reference books

1. Python for Data Analysis, Wes Mckinney, O'Reilly Media,2013.

2. Field Cady, "Data Science Hand Book", John Wiley & Sons,2017.

3. Fundamentals of Data Science, Samuel Burns, Amazon KDP printing and Publishing,2019.

4. Doing Data Science, Straight Talk From The Frontline, Cathy O'Neil and Rachel Schutt. O'Reilly.2014.

5. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, "Practical Data Science Cookbook", Packt Publishing Ltd.,2014.

6. Nathan Yau, "Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics", Wiley,2011.

7. ShaiVaingast, "Beginning Python Visualization Crafting Visual Transformation Scripts",

Apress, 2^{n}edition, 2014.

Web references:

- https://www.dataquest.io/course/pandas-fundamentals/
- https://onlinecourses.nptel.ac.in/noc18_cs28/
- https://pandas.pydata.org/pandas-docs/stable/reference/general_functions.html
- https://www.guru99.com/data-science-tutorial.html

COURSE OUTCOMES:

At the end of the course, the students will be able to

- **CO1** – Understand application of mathematics for data analysis and machine learning
- **CO2 –** To learn the probability distributions and density estimations to perform analysis of various kinds of data
- **CO 3 –** Identify various phases involved in the life cycle of Data Science
- **CO 4 –** Preprocess and manage the data for efficient storage and manipulation in Python
- **CO 5 –** Realize the various data analytics techniques for labeled/columnar Data using Python Pandas
- **CO 6 –** Explore a flexible range of data visualizations approaches inPython.

PO vs CO MAPPING

CO. No	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
	2		2						3			
	3	3	2		3	3	3					2
	2	2	3				2					
	3		2	2					2			
	3	3	2	3	2	2	2				3	2
	3											

1→Low 2→Medium 3→High

19IT5S002   DATA MINING USING R   **L T P C**

                                                             3 0 1 4

OBJECTIVES:

  To impart knowledge on

1. Fundamentals of data mining and Basic R programming

2. Understanding classification and regression techniques and applying using R

3. Implementation and visualization of clustering & outliers in R

4. Prediction based on association rules and time series analysis in R

5. Explore R for various applications.

PREREQUISITE: Fundamentals of Data science and Probability and statistics

UNIT I   DATA MINING FUNDAMENTALS AND R BASICS   6

Introduction to Data Mining – Types of Data – Architecture – Knowledge Discovery Process - Basics of R – Working with Datasets in R – Data Import and Export – Save and Load- Data in Different Formats - Data Types – Vectors & operations – Matrices – Arrays – Factors & operations – Data Frames – Subsetting of Data Frames – List – Data Exploration and Visualization

UNIT II   CLASSIFICATION AND REGRESSION   6

Supervised Learning – Classification – Decision Tress – Working with party and rpart module – Random Forest –Regression – Linear Regression – Logistic Regression – Non Linear Regression

UNIT III   CLUSTERING AND OUTLIER DETECTION   6

Unsupervised Learning – Partition based methods : K-Means Clustering – K-Medoids Clustering – Hierarchical Clustering – Density-based Clustering – Outlier Detection – Univariate Outlier Detection – Detect by Clustering – Comparative analysis

UNIT IV   TIME SERIES AND ASSOCIATION RULE   6

Time Series Data in R – Decomposition – Time Series Forecasting – Time Series Clustering – Time Series Classification – Association Rule Mining – Removing Redundancy – Interpreting Rules – Visualizing Association Rules

UNIT V   TEXT MINING & SOCIAL NETWORK ANALYSIS   6

Text Mining – Applications in R – Social Network Analysis – Network of Terms – Network of Tweets – Two-Mode Network – Analysis and Forecasting of House Price Indices - Customer Response Prediction and Profit Optimization

                                                             TOTAL HOURS: 30

LIST OF EXPERIMENTS

1. Data Exploration with R

2. Visualizing data using ggplot

3. Prediction using linear regression in R

4. Prediction using logistic regression

5. Implement k-means clustering in R

6. Implementation of Decision tree classifier in R

7. Naïve Bayes classifier implementation in R

8. Implement Association rule mining in R

9. Implement Time series analysis in R

30 Hours

Text Book:

1. Yanchang Zhao, "R and Data Mining: Examples and Case Studies", Academic Press, First Edition,2013

2. Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques", Elsevier - Morgan Kaufmann Publisher, Second Edition, 2012.

3. Thomas Mailund - "Beginning Data Science in R – Data Analysis, Visualization and modeling for data scientist", Springer, 2017.

Reference Book:

1. K.G.Srinivasa, G M Siddesh, Chetan Shetty, "Statistical Programming in R", Oxford University Press, New Delhi, 2017

2. John Chambers, "Software for Data Analysis: Programming with R ", Springer; 1st ed. 2008. , 2nd printing 2009 edition

3. Thomas Lumley," Complex Surveys: A Guide to Analysis Using R", Wiley Series in survey methodology,2010

4. Nicholas J. Horton, Ken Kleinman," Using R and RStudio for Data Management, Statistical Analysis, and Graphics" , CRC Press, Second edition,2015

5. John Maindonald, W. John Braun, "Data Analysis and Graphics Using R: An Example-Based Approach", University Press, Cambridge, Third edition,2010

Course Outcome:

At the end of the course, the students will be able to

- **CO1 –** Know the knowledge discovery mechanism and basic concepts in data mining
- **CO2 –** Carry out basic operations and perform import &export data using R
- **CO3 –** Understand and Evaluate supervised learning techniques inR
- **CO4 –** Use R to perform clustering and to detectoutliers
- **CO5 –** Explore data analysis for time series and build associationrules
- **CO5 –** Apply R for text mining and otherapplications

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO1	3	2	2						2			
CO2	3	3	2		3	3						3
CO3		2	2				3					
CO4	3			2								
CO5		2	2	3	2	2	2					2
CO6	3											

1→Low 2→Medium 3→High

19IT6S003	DATA WRANGLING	L T P C
		3 0 0 3

OBJECTIVES:

The student should be made to:

1. Be exposed with the introduction to data wrangling.
2. To understand the modeling aspects of data clean up.
3. To understand the concepts of data exploration and analysis.
4. To analyze the concepts of web scraping.

PREREQUISITE: Python Programming

UNIT I   INTRODUCTION TO DATAWRANGLING   9

What Is Data Wrangling?- Importance of Data Wrangling -How is Data Wrangling performed?- Tasks ofData Wrangling-Data Wrangling Tools-Introduction to Python-Python Basics-Data Meant to Be Read by Machines-CSV Data-JSON Data-XML Data.

UNIT II   WORKING WITH EXCEL FILESANDPDFS   9 Installing Python Packages-Parsing Excel Files-Parsing Excel Files -Getting Started with Parsing-PDFs and Problem Solving in Python-Programmatic Approaches to PDF Parsing-Converting PDF to Text-Parsing PDFs Using pdf miner-Acquiring and Storing Data-Databases: A Brief Introduction-Relational

Databases: MySQL and PostgreSQL-Non-Relational Databases: NoSQL-When to Use a Simple File-Alternative Data

Storage.

UNIT III   DATA CLEANUP   9

Why Clean Data?- Data Cleanup Basics-Identifying Values for Data Cleanup-Formatting Data-Finding Outliers and Bad Data-Finding Duplicates-Fuzzy Matching-RegEx Matching-Normalizing and

Standardizing the Data-Saving the Data-Determining suitable Data Cleanup-Scripting the Cleanup-Testing with New Data

UNIT IV   DATA EXPLORATION AND ANALYSIS   9 Exploring Data-Importing Data-Exploring Table Functions-Joining Numerous Datasets-Identifying Correlations-Identifying Outliers-Creating Groupings-Analyzing Data-Separating and Focusing the Data- Presenting Data-Visualizing the Data-Charts-Time-Related Data-Maps-Interactives-Words-Images, Video, and Illustrations-Presentation Tools-Publishing the Data-Open Source Platforms.

UNIT V   WEBSCRAPING   9

What to Scrape and How-Analyzing a Web Page-Network/Timeline-Interacting with JavaScript-In-Depth Analysis of a Page-Getting Pages-Reading a Web Page-Reading a Web Page with LXML-XPath-Advanced Web Scraping-Browser-Based Parsing-Screen Reading with Selenium-Screen Reading with Ghost.Py-Spidering the Web-Building a Spider with Scrapy-Crawling Whole Websites with Scrapy.

TOTAL HOURS: 45

TEXT BOOK:

1. Jacqueline Kazil & Katharine Jarmul," Data Wrangling with Python", O'Reilly Media, Inc,2016

REFERENCE(S):

1. Dr. TirthajyotiSarkar, Shubhadeep," Data Wrangling with Python: Creating   actionable data from raw sources", Packt Publishing Ltd,2019.

2. Stefanie Molin," Hands-On Data Analysis with Pandas", Packt Publishing Ltd,2019

3. Allan Visochek," Practical Data Wrangling", Packt Publishing Ltd,2017

4. TyeRattenbury, Joseph M. Hellerstein, Jeffrey Heer, Sean Kandel, Connor Carreras," Principles of Data Wrangling: Practical Techniques for Data Preparation", O'Reilly Media, Inc,2017

COURSE OUTCOMES:

 At the end of the course the students will be able to

- **CO1 -** Identify and execute the basic data format.
- **CO2 -** Perform the computations with Excel and pdf files.
- **CO3 -** Understand the concepts of data cleanup.
- **CO4 -** Explore and analyze the Image and video data.
- **CO5 -** Understand the concepts web scraping.
- **CO6 -** Understand the concepts of data extraction.

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO1	2	3	2						2			
CO2	3		2		2	3	2			3		3
CO3	3	2	3	2								
CO4	2		2	2					3			
CO5	3	2	2	3	2	2	2				2	2
CO6		3								2		

1→Low 2→Medium 3→High

19IT7S004   DATA VISUALIZATION FOR ENGINEERS   **L T P C**

                                                           3 0 1 4

OBJECTIVES:

The objective of this course is to enable the students to

- Inspect and interpret the engineering data and preparing meaningful and aesthetically pleasing scientific reports
- Understand data representations and mappings in order to produce sensible results
- Use their perception to better understand this data
- Understand data distributions, associations and time series

PREREQUISITE:

- Data Mining with R, Data Analysis

UNIT I   INTRODUCTION TO VISUALIZATION   6

Visualizing Data-Mapping Data onto Aesthetics, Aesthetics and Types of Data, Scales Map Data Values onto Aesthetics, Coordinate Systems and Axes- Cartesian Coordinates, Nonlinear Axes, Coordinate Systems with Curved Axes, Color Scales-Color as a Tool to Distinguish, Color to Represent DataValues, Color as a Tool to Highlight, Directory of Visualizations-Amounts, Distributions, Proportions, x–y relationships, Geospatial Data

UNIT II   VISUALIZING DISTRIBUTIONS   6

Visualizing Amounts-Bar Plots, Grouped and Stacked Bars, Dot Plots and Heat maps, Visualizing Distributions: Histograms and Density Plots-Visualizing a Single Distribution, Visualizing Multiple Distributions at the Same Time, Visualizing Distributions: Empirical Cumulative Distribution Functions and Q-Q Plots-Empirical Cumulative Distribution Functions, Highly Skewed Distributions, Quantile-Quantile Plots, Visualizing Many Distributions at Once-Visualizing Distributions Along the Vertical

Axis, Visualizing Distributions Along the Horizontal Axis

UNIT III   VISUALIZING PROPORTIONS AND ASSOCIATIONS   6

Visualizing Proportions-A Case for Pie Charts, A Case for Side-by-Side Bars, A Case for Stacked Bars and Stacked Densities, Visualizing Proportions Separately as Parts of the Total ,Visualizing Nested Proportions- Nested Proportions Gone Wrong, Mosaic Plots and Treemaps, Nested Pies ,Parallel Sets. Visualizing Associations: Among Two or More Quantitative Variables-Scatterplots, Correlograms, Dimension Reduction, Paired Data.

UNIT IV   TIME SERIES AND FORECASTING   6

Visualizing Time Series and Other Functions of an Independent Variable-Individual Time Series , Multiple Time Series and Dose–Response Curves, Time Series of Two or More Response Variables, Visualizing Trends-Smoothing, Showing Trends with a Defined Functional Form, Detrending and Time-Series Decomposition , Case study on weather forecasting data

UNIT V   VISUALIZATION FOR ENGINEERING APPLICATIONS   6

Real time application development: Visualization for control engineering and predictive maintenance of machines – Construction data management through geo-spatial data visualization – Pollution control by visualizing air quality data – Stock Market Trend Prediction through time series analysis – Disaster management by visualizing associations.

LIST OF EXPERIMENTS

1. Histogram and Bar charts using R
2. Create different scatter plots for variables in any dataset
3. Enhancing Aesthetics with color scales
4. Illustrations for Heat maps and correlograms
5. Implementation of time series visualization
6. Visualizing associations and proportions
7. Generating 3D graphs
8. Visualizing geographic data with ggmap
9. Visualization of forecasting and trend analysis
10. Case study on Business data analysis and visualization

TOTAL HOURS: 60

Text Book:

1. Claus O.Wilke, "Fundamentals of Data visualization", O. Reilly Media, First Edition, march 2019
2. Eric Pimpler, "Data Visualization and Exploration with R", Geospatial Training Services, First edition, 2017

Reference books:

1. Tony Fischetti, Brett Lantz, R: Data Analysis and Visualization,O'Reilly ,2016

2. Robert I. Kabacoff ,"R in Action: Data Analysis and Graphics with R", Manning Publications, Second Edition, 2015

3. Nicholas J.Horton and Ken Kleinman,"Using R and R Studio for Data Management, Statistical analysis and Graphics", CRC Press, Taylor and Francis Group, Second Edition 2015

Web references:

1. https://www.analyticsvidhya.com/blog/2015/07/guide-data-visualization-r/
2. https://www.kdnuggets.com/2018/06/7-simple-data-visualizations-should-know-r.html

Course Outcomes

At the end of the course, students will be able to

- **CO1 -** Be familiar with key concepts, principles and methods in data visualization
- **CO2 –** Understand the value of visualization, specific techniques in information visualization and scientific visualization
- **CO3 -** Visualize the data in engineering applications and advertently make visual choices
- **CO4 -** Visualize data distributions and proportions
- **CO5 -** Understand trend prediction and uncertainties
- **CO6 -** Develop skills to both design and critique visualization

PO vs CO MAPPING

CO. No	PO$_a$	PO$_b$	PO$_c$	PO$_d$	PO$_e$	PO$_f$	PO$_g$	PO$_h$	PO$_i$	PO$_j$	PO$_k$	PO$_l$
CO1	2	2	2	2					2			
CO2	3	3	2		3	3	3					3
CO3	3	2	2	3								
CO4	3		3	2					3			
CO5		2	2	3	2	2	2				2	2
CO6												

1→Low 2→Medium 3→High

19IT8S005   BUSINESS INTELLIGENCE AND ANALYTICS   **L T P C**

3 0 0 3

OBJECTIVES:

The student should be made to:

1. Be exposed with the basic rudiments of business intelligence system.
2. To understand the modeling aspects behind Business Intelligence.
3. To understand the business intelligence life cycle and the techniques used in it.
4. Be exposed with different data analysis tools and techniques.

PREREQUISITE:

- Fundamentals of Data Science

UNIT I   BUSINESS INTELLIGENCE   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   KNOWLEDGE DELIVERY   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   EFFICIENCY   9

Efficiency measures – The CCR model: Definition of target objectives – Peer groups – Identification of good operating practices – Cross efficiency of analysis – Virtual inputs and outputs – Other models – Pattern matching – Cluster analysis – outlier analysis.

UNIT IV   ARCHITECTING THE DATA   9

Introduction, Types of Data, Enterprise Data Model, Enterprise Subject Area Model, Enterprise Conceptual Model, Enterprise Conceptual Entity Model, Granularity of the Data, Data Reporting and Query Tools, Data Partitioning, Metadata, Total Data Quality Management (TDQM).

UNIT V   DATA EXTRACTION   9 Introduction, Data

Extraction, Role of ETL process, Importance of source identification, Various data extraction techniques, Logical extraction methods, Physical extraction methods, Change data capture.

TOTAL HOURS: 45

TEXT BOOK:

1. Efraim Turban, Ramesh Sharda, DursunDelen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.

REFERENCE(S):

1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
2. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide", Second Edition, 2012.
4. CindiHowson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw-Hill, 2007.

5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,2007.

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1 - Explain the fundamentals of business intelligence.
- CO2 - Link data mining with business intelligence.
- CO3 - Apply various modeling techniques.
- CO4 - Explain the data analysis and knowledge delivery stages.
- CO5 - Apply business intelligence methods to various situations.
- CO6 - Decide on appropriate technique.

PO vs CO MAPPING

CO. No	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	3	2	2						2			
CO2	3		2		3	3	3					3
CO3	3	2	2	3			3					
CO4	3		2	2								
CO5	3	2	2	3	2	2	2				2	2
CO6												

1→Low 2→Medium 3→High

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