SENGUNTHAR ENGINEERING COLLEGE
(AUTONOMOUS)
(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
Recognized Under Section 2(f) & 12(B) of the UGC Act, 1956
NAAC Accredited with 'A' Grade
TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU
ESTD 2001
ISO 9001 REGISTERED

REGULATIONS, CURRICULUM & SYLLABI

B.E. COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

(CHOICE BASED CREDIT SYSTEM)

REGULATIONS - 2019

Note: The regulations hereunder are subject to amendments as may be decided by the Academic Council of the Sengunthar Engineering College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.

DEPARTMENT

OF

COMPUTER SCIENCE AND ENGINEERING

REGULATION 2019

CURRICULUM AND SYLLABI

FOR B.E.–COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

(For the Students admitted in the Academic Year 2022-2023 onwards)

FIRST SEMESTER

TO

EIGHTH SEMESTER

SENGUNTHAR ENGINEERING COLLEGE

EDUCATION EDIFICATION ELEVATION

Estd : 2001

SENGUNTHAR

Strive 2 Success

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INDEX

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SCHEME FOR CURRICULUM

B.E. –Computer Science and Engineering (Cyber Security)

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CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2022-2023 onwards)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.E. – COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) – FIRST SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19HST101	Communicative Techno English - I	HS	3	0	0	3	40	60	100
19MAT101	Engineering Mathematics - I	BS	3	1	0	4	40	60	100
19CYE101	Engineering Chemistry	BS	3	0	2	4	50	50	100
19PHE101	Engineering Physics	BS	3	0	2	4	50	50	100
19GET101	Engineering Graphics	ES	3	0	0	3	40	60	100
19GEE101	Computer Fundamentals and Python Programming	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSES									
19EEC101	Life Skills for Engineers	EEC	0	0	2	0	100	-	100
MANDATORY COURSES									
19MDC101	Induction Program (2 Weeks)	MC	-	-	-	-	-	-	-
Total Credits in Semester I			**22**						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
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PE : Professional Elective
OE : Open Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
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T : Tutorial
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C : Credit Point
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ESE : End Semester Examination
TOT : Total

B.E. – COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) - SECOND SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19HST201	Communicative Techno English -II	HS	3	0	0	3	40	60	100
19MAT201	Engineering Mathematics - II	BS	3	1	0	4	40	60	100
19CYT201	Environmental Science and Engineering	BS	3	0	0	3	40	60	100
19PHT202	Solid State Physics and Nano Electronic Devices	BS	3	0	0	3	40	60	100
19GET203	Basic Civil and Mechanical Engineering	ES	3	0	0	3	40	60	100
19CSE201	C Programming	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSES									
19EEC201	Technical Skill (Multimedia)	EEC	0	0	2	0	100	-	100
MANDATORY COURSES									
19MDC201	NSS/YRC/RRC	MC	-	-	-	-	100	-	100
Total Credits in Semester II			**20**						

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B.E. – COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) - THIRD SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19MAT301	Transforms and Partial Differential Equations	BS	3	1	0	4	40	60	100
19CST301	Data Structures	PC	3	0	0	3	40	60	100
19CCT301	Information Security Fundamentals	PC	3	0	0	3	40	60	100
19ECT302	Analog and Digital Communication	ES	3	0	0	3	40	60	100
19CSE301	Object Oriented Programming	PC	3	0	2	4	50	50	100
19ECE301	Digital Electronics	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSES									
19EEC301	Communication Skills	EEC	0	0	2	0	100	-	100
MANDATORY COURSES									
19MDC301	Leadership Enhancement Programme	MC	1	0	0	0	100	-	100
Total Credits in Semester III			**21**						

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BS : Basic Sciences
ES : Engineering Sciences
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TOT : Total

B.E. – COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) - FOURTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19MAT401	Probability and Queuing Theory	BS	3	1	0	4	40	60	100
19CST302	Computer Organization and Architecture	PC	3	0	0	3	40	60	100
19CCT401	Modern Cryptography	PC	3	1	0	4	40	60	100
19CST403	Software Engineering	PC	3	0	0	3	40	60	100
19CSE401	Database Management Systems	PC	3	0	2	4	50	50	100
19CCE401	Operating Systems	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSES									
19EEC302	Entrepreneurship Development Activities	EEC	0	0	2	0	100	-	100
MANDATORY COURSES									
19MDC402	Value Added Course-I	MC	-	-	-	-	100	-	100
Total Credits in Semester IV			**22**						

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TOT : Total

B.E. – COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) – FIFTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19MAT501	Mathematical Foundations for Cyber Security	BS	3	1	0	4	40	60	100
19CST501	Artificial Intelligence	PC	3	0	0	3	40	60	100
19CST602	Compiler Design	PC	3	1	0	4	40	60	100
19CCE501	Physical and System Security	PC	3	0	2	4	50	50	100
19CSE602	Internet Programming	PC	3	0	2	4	50	50	100
19CSE501	Computer Networks	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSES									
19EEC501	Quantitative Aptitude Learning	EEC	0	0	2	0	100	-	100
MANDATORY COURSES									
19MDC501	Value Added Course - II	MC	-	-	-	-	100	-	100
			23						

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EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
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ESE : End Semester Examination
TOT : Total

B.E. – COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) – SIXTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19CCT601	Block chain Technology	PC	3	0	0	3	40	60	100
19CCT602	Network Security	PC	3	1	0	4	40	60	100
19CCE601	Secure Coding	PC	3	0	2	4	50	50	100
19CCE602	Big Data and Cloud Computing	PC	3	0	2	4	50	50	100
	Professional Elective - I	PE	3	0	0	3	40	60	100
	Open Elective - I	OE	3	0	0	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSES									
19CCJ601	Mini Project	EEC	0	0	2	1	100	-	100
MANDATORY COURSES									
19MDC601	Constitution of India	MC	1	-	-	-	100	-	100
Total Credits in Semester VI			**22**						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E. – COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) - SEVENTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19CCT701	Cyber Security Laws	PC	3	0	0	3	40	60	100
19CCE701	Web Security	PC	3	0	2	4	50	50	100
	Professional Elective - II	PE	3	0	0	3	40	60	100
	Open Elective - II	OE	3	0	0	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSES									
19CCJ701	Project Phase-I	EEC	0	0	2	1	100	-	100
Total Credits in Semester VII			**14**						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B.E. – COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)- EIGHTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
	Professional Elective - III	PE	3	0	0	3	40	60	100
	Professional Elective - IV	PE	3	0	0	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSES									
19CCJ801	Project Phase-II	EEC	0	0	20	10	40	60	100
Total Credits in Semester VIII			**16**						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

Total Credits: 160

LIST OF PROFESSIONAL CORE (PC) COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19CSE201	C Programming	PC	3	0	2	4	50	50	100
19CCT301	Information Security Fundamentals	PC	3	0	0	3	40	60	100
19CST301	Data Structures	PC	3	0	0	3	40	60	100
19CST302	Computer Organization and Architecture	PC	3	0	0	3	40	60	100
19CSE301	Object Oriented Programming	PC	3	0	2	4	50	50	100
19CCE401	Operating Systems	PC	3	0	2	4	50	50	100
19CCT401	Modern Cryptography	PC	3	1	0	4	40	60	100
19CST403	Software Engineering	PC	3	0	0	3	40	60	100
19CSE401	Database Management Systems	PC	3	0	2	4	50	50	100
19CSE501	Computer Networks	PC	3	0	2	4	50	50	100
19CST501	Artificial Intelligence	PC	3	0	0	3	40	60	100
19CST602	Compiler Design	PC	3	1	0	4	40	60	100
19CCE501	Physical and System Security	PC	3	0	2	4	50	50	100
19CSE602	Internet Programming	PC	3	0	2	4	50	50	100
19CCT601	Block-chain Technology	PC	3	0	0	3	40	60	100
19CCT602	Network Security	PC	3	1	0	4	40	60	100
19CCE601	Secure Coding	PC	3	0	2	4	50	50	100
19CCE602	Big Data and Cloud Computing	PC	3	0	2	4	50	50	100
19CCT701	Cyber Security Laws	PC	3	0	0	3	40	60	100
19CCE701	Web Security	PC	3	0	2	4	50	50	100

LIST OF PROFESSIONAL ELECTIVE (PE) COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
SEMESTER VI									
19CSPX01	Data Warehousing and Mining	PE	3	0	0	3	40	60	100
19CCPX01	Mobile Computing	PE	3	0	0	3	40	60	100
19CCPX02	Vulnerability Analysis and Penetration Testing	PE	3	0	0	3	40	60	100
19CCPX03	Ethical Hacking	PE	3	0	0	3	40	60	100
SEMESTER VII									
19CCPX04	Mobile and Wireless Security	PE	3	0	0	3	40	60	100
19CST601	Machine Learning Techniques	PE	3	0	0	3	40	60	100
19CCPX05	WSN Security	PE	3	0	0	3	40	60	100
19CCPX18	Resource Management Techniques	PE	3	0	0	3	40	60	100
SEMESTER VIII									
19CCPX06	Data Privacy	PE	3	0	0	3	40	60	100
19CCPX07	Cyber Forensics and Investigation	PE	3	0	0	3	40	60	100
19CCPX08	Mobile OS Security	PE	3	0	0	3	40	60	100
19CCPX09	Intrusion Detection and Prevention	PE	3	0	0	3	40	60	100
19CCPX10	Biometrics and Security	PE	3	0	0	3	40	60	100
19CCPX11	Information Security Risk Management	PE	3	0	0	3	40	60	100
19CCPX13	Cloud Security	PE	3	0	0	3	40	60	100
19CSPX17	Internet of Things	PE	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE (OE) COURSES FOR OTHER BRANCHES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19CCOX01	Human Computer Interaction	OE	3	0	0	3	40	60	100
19CCOX02	Enterprise Resource Planning	OE	3	0	0	3	40	60	100
19CCOX03	Security in Industry 4.0	OE	3	0	0	3	40	60	100
19CCOX04	Social Network Analysis	OE	3	0	0	3	40	60	100
19CCOX05	Web Designing	OE	3	0	0	3	40	60	100
19CCOX06	Customer Relationship Management	OE	3	0	0	3	40	60	100
19CCOX07	Cyber Crime Investigation and Digital Forensics	OE	3	0	0	3	40	60	100
19CCOX08	E-Commerce and Applications	OE	3	0	0	3	40	60	100
19CCT101	Information Security Fundamentals	OE	3	0	0	3	40	60	100
19CCT201	Essentials of Cyber Security	OE	3	0	0	3	40	60	100

LIST OF GENERAL ELECTIVE (GE) COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19NCCL01	NCC AIRFORCE LEVEL - 1	GE	2	0	2	3	40	60	100
19NCCL02	NCC AIRFORCE LEVEL - 2	GE	2	0	2	3	40	60	100

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B.E. –Computer Science and Engineering (Cyber Security)

SEMESTER I

19HST101 COMMUNICATIVE TECHNO ENGLISH - I **L T P C**
(Common to all branches) **3 0 0 3**

OBJECTIVES

- To understand the basics of the English Language in a graded manner.
- To enrich grammar usage for the development of all the four language skills (LSRW).
- To improve writing skills to express thoughts freely through Informal Letter, e-mail writing.
- To develop speaking skills through self introduction and delivering speeches.
- To enhance the Reading Skills.

UNIT I VOCABULARY **8**

Synonyms and Antonyms – Single Word Substitutes – Use of Abbreviations and Acronyms – Homonyms and Homophones – Business Vocabulary – Commonly Confused Words – Collocation – British and American Vocabulary – Word formation.

Activity: Grammar worksheets on the given topics.

UNIT II GRAMMAR **10**

Parts of speech - Be, Have and Do verbs - Punctuation - Tenses - Numerical Adjectives - modal verbs - Single line Definition- Direct and Indirect Speech- Gerunds and Infinitives - Same Word Used as Different Parts of Speech.

Activity: Grammar worksheets on the given topics.

UNIT III INFORMAL WRITING **9**

Letter Writing – Informal Letters – e-mail Writing – Informal Dialogues – Essay Writing – Informal Essays – Movie Reviews – Writing Instructions.

Activity: Giving topic and ask the students to write informal letters, e-mail.

UNIT IV LANGUAGE ENHANCEMENT THROUGH SPEAKING **9**

Self Introduction – (exchanging personal information) personal information, hobbies, strengths and weaknesses, likes and dislikes, special features of home town. Narrating Personal Experiences and Incidents – Two minute talk – expressing attitudes and opinions in Debate discussion. SEC - B.E.-CSE(CYBER SECURITY)- R2019 – MAY 22

Activity: Ask the students to speak about the above given topics.

UNIT V READING SKILLS **9**

Reading Comprehension – reading techniques, pre-reading, post-reading, comprehension questions (multiple choice questions or short questions) – Short comprehension passages, practice skimming – scanning and predicting – Reading the passage and taking (Note making) Notes – Scan and understand main contents of the passage.

Activity: Giving topic and ask the students to find out answers for given passage

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Use a wide range of vocabulary in oral and written communication
- Frame grammatically correct sentences.
- Write informal letters and other communications.
- Give short informal presentations and participate in classroom discussions
- Learn to acquire usage of English.

TEXT BOOKS

1. Board of Editors, "Using English A Course book for Under graduate Engineers and Technologists"', Orient Black Swan Limited, Hyderabad, 2015.
2. Richards, C. Jack, "Interchange Students' Book – 2", New Delhi – CUP, 2015.

REFERENCES

1. Department of English, Anna University, "Mindscapes: English for Technologists and Engineers", 1st Edition, Orient Black Swan, Chennai. 2012.
2. Krishna Mohan, Meera Banerji ,"Developing Communication Skills", MacMillan Publishers, Paperback 2019.

E – RESOURCES

1. http://www.usingenglish.com
2. https://www.khanacademy.org/humanities/grammar

19MAT101	ENGINEERING MATHEMATICS – I (Common to all branches)	L T P C 3 1 0 4

OBJECTIVES

- To develop the use of matrix algebra techniques that are needed by engineers for practicalapplications.
- To familiarize the students with differential calculus.
- To describe the student with functions of several variables.
- To explore the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I MATRICES **9+3**

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II DIFFERENTIAL CALCULUS **9+3**

Representation of function – Limit of a function – Continuity – Derivatives – Differentiation rule – Maximum and Minimum values – absolute Maximum and Minimum – local Maximum and Minimum.

UNIT III FUNCTIONS OF SEVERAL VARIABLES **9+3**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Jacobians –Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS **9+3**

Definite and Indefinite integral-Substitution rule – Integration by parts – Trigonometric substitutions – Integration of rational function by partial fraction – Improper integrals – Bernoulli's formula.

UNIT V MULTIPLEINTEGRALS **9+3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

TOTAL : 45+15=60 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Classify the matrix algebra methods for solving practical problems.
- Discover differential calculus tools in solving various application problems.
- Develop differential calculus ideas on several variable functions.
- Compare different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7thEdition, New Delhi, 2015.

REFERENCES

1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
2. Jain R.K. and Iyengar S.R.K.,"Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.

E – RESOURCES

1. https://nptel.ac.in/courses/111/105/111105121/ (Rolle`s Theorem)
2. https://nptel.ac.in/courses/111107112(Linear Algebra)

19CYE101 **ENGINEERING CHEMISTRY** **L T P C**
(Lab Embedded Theory Course) **3 0 2 4**
(Common to all branches)

OBJECTIVES

- To classify the impurities of water and know the treatment and the conditioning methods for domestic and industrial uses.
- To outline about fundamentals, properties and moulding process of polymers.
- To discuss the types of corrosion and control measures and working of batteries.
- To explain about the phase rule and its applications to engineering field and also gain knowledge about the properties of alloys.
- To summarize the basics of Nanochemistry, synthesis, properties and applications of Nano materials.
- To acquire practical skills in the determination of water quality parameters, molecular weight of polymer, rate corrosion through volumetric and instrumental analysis.

UNIT I WATER TECHNOLOGY **9**

Introduction – Characteristics – hardness – estimation of hardness by EDTA method – alkalinity and its estimation – Boiler feed water – requirements – Boilers troubles (Scale and Sludge) – Internal conditioning (colloidal – phosphate – calgon and carbonate conditioning methods) – External conditioning – zeolite process, demineralization process – Desalination of brackish water by reverse osmosis – Municipality water treatment – Break point chlorination.

UNIT II POLYMER CHEMISTRY **9**

Introduction – Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types of polymerization: Addition condensation and copolymerization, Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Preparation, properties and uses of PVC, Nylon 6,6, Polyethylene – Rubbers – types – vulcanization of rubber – Plastics – Moulding constituents of plastics – Moulding of plastics – compression, injection and blow moulding – Biodegradable polymers – Conducting polymers.

UNIT III CORROSION AND BATTERY TECHNOLOGY **9**

Corrosion – Types – Chemical Corrosion – Electrochemical Corrosion (galvanic and Differential aeration) – Factors influencing corrosion – Material selection and design aspects – control methods of corrosion – Sacrificial anodic and impressed current cathodic protection – Protective

coatings – paints – constituents and their functions – electroplating of Copper – electroless plating of Nickel. Batteries: Definition, Types – example, Lead acid battery, Lithium ion battery – H2 – O2 fuel cell – solar cell.

UNIT IV PHASE RULE AND ALLOYS 9

Phase rule – explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only).

Alloys: Introduction – definition – properties of alloys – significance of alloying, functions and effect of alloying elements – ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT V CHEMISTRY OF NANO MATERIALS 9

Nano chemistry – Basics (Surface area to volume ratio-Quantum confinement – 0D, 1D, 2D & 3D) – Distinction between Molecules, Nanoparticles and Bulk Materials – Characterisation of nano materials using XRD and SEM. Synthesis of nano materials: Top down approach – Ball milling – Bottom up approach – Sol-gel method, Chemical vapour deposition – Properties of nanomaterials and Applications of Nanomaterials (Nano products of today).

LABORATORY PART 15

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by Argentometric method.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Estimation of sodium and potassium present in water using flame photometer.
7. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
8. Conductometric titration of strong acid vs strong base.
9. Corrosion experiment-weight loss method.
10. Estimation of copper content in the brass by Iodometry.
11. Determination of pH of soil.

TOTAL : 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Develop innovative methods to produce soft water for industrial and domestic use at cheaper cost.
- Understand the chemical structure of polymers and its effect on their various properties when used as engineering materials and also discuss the applications of polymers.
- Illustrate the principles involved in corrosion reactions and techniques used for preventing it and acquire the ability to design and develop materials for energy storage systems.
- Acquire knowledge of phase, equilibrium, component, degree of freedom and phase rule concepts, basic's of alloys and its applications.
- Explain the basics of nanochemistry, synthesis, characterization, properties of nanomaterials and its applications.
- Apply the practical knowledge for determining the water quality parameters and demonstrate the instrumental analysis.

TEXT BOOKS

1. Jain P.C and Monika Jain, "Engineering Chemistry", Dhanpet Rai Publishing Company (P) Ltd.,New Delhi, 2013.
2. Viswanathan B, "Nanomaterials", Alpha Science International Ltd, 2009.

REFERENCES

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw–Hill Publishing Company Ltd, New Delhi, 2012.

E – RESOURCES

1. https://nptel.ac.in/courses/118104008
2. https://nptel.ac.in/courses/118102003

19PHE101 **ENGINEERING PHYSICS** **L T P C**
(Lab Embedded Theory Course) **3 0 2 4**
(Common to all branches)

OBJECTIVES

- To recognize the structure of crystalline materials using crystallographic knowledge.
- To apply the knowledge of material's elasticity, stress, strain for industrial applications.
- To generalize the fundamentals of lasers and optical fibres, as well as their applications.
- To investigate the complex physical phenomenon using the fundamental principles of quantum mechanics and Schrödinger's wave equation.
- To design the structures with acoustics, ultrasonic production for structural applications.
- To judge the Engineering Physics that can be applied to optics, thermal physics, matter characteristics and to determine fluid properties.

THEORY PART:

UNIT I STRUCTURE OF SOLIDS **9**

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d -Spacing in Cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Crystal Growth Techniques –Solution, melt (Bridgman and Czochralski) and Vapour growth techniques(qualitative).

UNIT II ELASTICITY **9**

Elasticity – Stress-Strain diagram and its uses - Factors affecting elastic modulus and tensile strength – Torsional stress and deformations – Twisting couple - Torsion pendulum: theory and experiment - Bending of beams :Bending moment – Cantilever: Theory and Experiment – Uniform and Non-uniform bending: Theory and experiment - I- Shaped girders.

UNIT III PHOTONICS **9**

Introduction to interaction of radiation with matter- Spontaneous and Stimulated emission- Population Inversion - Derivation of Einstein's A and B coefficients – Principle and working of Laser - Nd:YAG laser - Direct bandgap and indirect band gap semiconductors - Semiconductor diode Laser- Principle and propagation light in optical fibres- Derivation of Numerical aperture and Acceptance angle - Fibre optic communication system.

UNIT IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Compton Effect: theory and experimental verification – Wave particle duality – Electron diffraction – Concept of wave function and its Physical significance – Schrödinger's wave equation: Time independent and time dependent equations – Particle in a one-dimensional rigid box- Quantum Tunnelling –Tunnelling Electron Microscope.

UNIT V ACOUSTICS AND ULTRASONICS 9

Classification of sound- decibel- Weber–Fechner law – Sabine's formula - Derivation using growth and decay method – Absorption Coefficient and its determination – Factors affecting acoustics of buildings and their remedies Introduction- Classification of Sound waves - Production of Ultrasonic's by magnetostriction and piezoelectric methods - Acoustic grating – Cavitations - Applications of Ultrasonic's

LABORATORY PART:

LIST OF EXPERIMENTS

(Eight experiments are to be conducted in Lab and Two experiments are to be conducted virtually)

1. Laser: Determination of wavelength of laser and particle Size.
2. Fibre Optics: Determination of Numerical Aperture and Acceptance angle.
3. Determination of wavelength of mercury spectrum- Spectrometer.
4. Determination of Young's modulus – Non- Uniform bending.
5. Determination of Young's modulus - Uniform bending.
6. Torsional Pendulum: Determination of moment of inertia and rigidity modulus.
7. Determination of velocity of ultrasonic in liquid.
8. Determination of Viscosity of a liquid –Poiseulle's Method
9. Photoelectric Effect.**(Virtual)**
10. Determination of band gap of semiconductor.**(Virtual)**

TOTAL: 45 + 15 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Familiarize the structure of crystalline solids by applying knowledge of crystallography.
- Analyze theories of failure and yield criteria as an elements of properties of matter.
- Learn the basics of lasers and optical fibers and their use in some applications
- Apply the basic principles of quantum mechanics and Schrödinger's wave equation to study the complex physical phenomenon
- Comprise the fundamentals of Acoustics, production and applications of ultrasonic's.
- Compose principles of elasticity, optics and acoustic properties in engineering applications through experiments.

TEXT BOOKS

1. AvadhanuluM.N& Kshirsagar P.G "Text Book of Engineering Physics", S.Chand, 2006.
2. P.Mani, "Engineering Physics Practicals", Dhanam Publications, 2019.

REFERENCES

1. Raghavan V, "Materials Science and Engineering: A First Course", PHI Publications, 2015.
2. Rajendran V, "Engineering Physics", Tata McGraw Hill Publications, 2012.

E - RESOURCES

1. https://www.classcentral.com/course/youtube-basic-courses-engineering-physics
2. https://www.courses.com/physics
3. https://vlab.amrita.edu/index.php?sub=1&brch=195&sim=840&cnt=1
4. https://bop-iitk.vlabs.ac.in/exp/energy-band-gap/

19GET101 **ENGINEERING GRAPHICS** **L T P C**
(Common to all branches) **3 0 0 3**

OBJECTIVES

- To understand the principles in graphics skill to communicate the concepts ideas and design of engineering components.
- To learn projections of points, lines, planes viewed in different positions.
- To learn the projection of solids viewed in different positions.
- To gain the knowledge about the section of solids and development of surfaces of the given solids.
- To expose the international standards of technical drawing.

UNIT I GENERAL PRINCIPLES OF ORTHOGRAPHIC PROJECTION 9

Graphics significance in engineering applications – study of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – principle of Letter writing and dimensioning. Projections of points, lines and planes. Principles of orthographic projection – First angle projection only – Layout of views – Projection of points located in all quadrant – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT II PROJECTION OF SOLIDS 9

Projections of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT III SECTION OF SIMPLE SOLIDS 9

Section of solids – prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane.

UNIT IV DEVELOPMENT OF SURFACES 9

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones with cutout, perpendicular and inclined to the horizontal axis

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 9

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Conversion of isometric projection into orthographic projection. Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Construct multiple views of engineering components.
- Prepare pictorial drawings as per the standards.
- Develop the projection of solids.
- Draw the section of solids drawings and development of surfaces of given objects.
- Apply free hand sketching and concept of isometric in engineering practice.

TEXT BOOKS

1. Venugopal K. and Prabhu Raja V.,"Engineering Graphics", 15th Edition, New Age International (P) Limited, New Delhi, 2018.
2. Natarajan K.V., "Engineering Graphics", 32nd Edition, Dhanalakshmi Publishers, Chennai, 2019.

REFERENCES

1. K.R.Gopalakrishna, "Engineering Drawing Volume 1 & 2", 55th Edition, Subhas Publications, Bangalore, 2017.
2. T.Jeyapoovan, "Engineering Graphics using Auto CAD", 3rd Edition, Vikas Publishing house Pvt Ltd, New Delhi, 2017.

E – RESOURCES

1. https://nptel.ac.in/courses/112/103/112103019/ (Geometric Constructions)
2. https://nptel.ac.in/courses/105/104/105104148/ (Projections)

19GEE101 COMPUTER FUNDAMENTALS AND PYTHON PROGRAMMING **L T P C**
(Lab Embedded Theory Course) **3 0 2 4**
(Common to all branches)

OBJECTIVES

- To enable the student to learn the major components of a computer system and software.
- To know the basics of algorithmic problem solving and fundamentals of python programming.
- To develop simple python programs.
- To define controls and functions in python.
- To use python data structures – lists, tuples and dictionaries.
- To practice the students to work with Word,excel and Python applications.

UNIT I INTRODUCTION **9**

Introduction, Characteristics of Computers, Generation and Classifications of Computers, Basic Computer Organization, Computer Software, Types of Software, Software Development Steps, Internet, Getting connected to Internet Applications.

UNIT II PROBLEM SOLVING AND PYTHON FUNDAMENTALS **9**

Algorithms, building blocks of algorithms (instructions/statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Introduction to Python: Basics of Python and history of Python – Unique features of Python, interpreter and interactive mode – values and types: int, float, boolean, string, and list; variables.

UNIT III EXPRESSIONS AND STATEMENTS **9**

Expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT IV CONTROL FLOW AND FUNCTIONS **9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions, Strings, Lists as arrays. Illustrative programs: square root, gcd, Tower of Hanoi, exponentiation, sum an array of numbers, linear search, binary search.

UNIT V LISTS, TUPLES AND DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Document Creation, Table Creation and Flow chart.
2. Spread sheet – Chart, Formula, Sorting.
3. Compute the GCD of two numbers.
4. Find the square root of a number (Newton‘s method).
5. Exponentiation (power of a number).
6. Find the maximum of a list of numbers.
7. Linear search and Binary search.
8. First n prime numbers.
9. Multiplication of two matrices.
10. Simulate elliptical orbits in Pygame.
11. Find the length of a list using recursion.

TOTAL : 45 +15 = 60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Know the Computer basics, Components and Sofwares.
- Develop algorithmic solutions to simple computational problems and Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Implement a Python program using functions.
- Represent compound data using Python lists, tuples, and dictionaries.
- Apply the practical knowledge on Word,Excel and Python Applications.

TEXT BOOKS

1. Ashok.N.Kamthane,“ Computer Programming”, Pearson Education (India),2015.
2. Allen B. Downey, ‘’Think Python: How to Think Like a Computer Scientist’’, 2nd Edition, Shroff/O’Reilly Publishers, 2016.

REFERENCES

1. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python Revised and updated for Python 3.2", Network Theory Ltd., 2011.
2. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem–Solving Focus", Wiley India Edition, 2013.

E – RESOURCES

1. https://nptel.ac.in/courses/106/106/106106145/ (Introduction to Algorithms)
2. https://nptel.ac.in/courses/106/106/106106182/ (Joy of Computing)

19EEC101 **LIFE SKILLS FOR ENGINEERS** **L T P C**
(Employability Enhancement Course) **0 0 2 0**
(Common to all branches)

OBJECTIVES

- To develop communication competence for engineers.
- To enable them to convey thoughts and ideas with clarity and focus.
- To inculcate critical thinking process.
- To prepare them on problem solving skills.
- To provide symbolic, verbal, and graphical interpretations of statements in a problem description.

UNIT I COMMUNICATION SKILL **6**

Introduction to Communication, The Process of Communication, Barriers to Communication, Listening Skills, Non-verbal Communication and Body Language, Interview Skills, Group Discussion, Presentation Skills, Technology-based Communication – Technical Presentation.

UNIT II CRITICAL THINKING & PROBLEM SOLVING **6**

Creativity, Lateral thinking, Critical thinking, Multiple Intelligence, Problem Solving, Mind Mapping & Analytical Thinking.

UNIT III CAREERSKILLS **6**

Introduction to Employability and Career Skills – developing a long-term career plan – making career changes – Time Management – General awareness of Current Affairs – Stress management – Leadership straits – Team work – Career planning.

UNIT IV ETHICS MORAL & PROFESSIONAL VALUES **6**

Human Values, Civic Rights, Engineering Ethics, Engineering as Social Experimentation, Environmental Ethics, Global Issues.

UNIT V LEADERSHIP SKILLS **6**

Leadership, Levels of Leadership, Making of a leader, Types of leadership, Transactions Vs Transformational Leadership, VUCA Leaders, DART Leadership, Leadership Grid & leadership Formulation.

TOTAL : 30 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Communicate effectively.
- Make effective presentations.
- Develop critical thinking.
- Face interview & group discussion.
- Critically think on a particular problem.

TEXT BOOKS

1. Remesh S and Vishnu R.G,"Life Skills for Engineers", McGraw Hill Education (India) Private Ltd., 2016.
2. E. Suresh Kumar et al.,"Communication for Professional Success",Orient Black swan: Hyderabad, 2015.

REFERENCES

1. Barun K. Mitra;, "Personality Development & Soft Skills", 1st Edition, Oxford Publishers,2011.
2. Kalyana, "Soft Skill for Managers"; 1st Edition, Wiley Publishing Ltd.,2015.

SEMESTER II

19HST201	**COMMUNICATIVE TECHNO ENGLISH - II** (Common to all branches)	**L T P C** **3 0 0 3**

OBJECTIVES

- To acquire usage of grammar in English language.
- To enhance the reading skill to comprehend technical writing.
- To improve business writing skills.
- To develop Presentation Skills In Analytical View.
- To develop their speaking skills and speak fluently in real contexts.

UNIT I GRAMMAR **9**

Compound words – prepositions – articles – conditionals – Direct and indirect speeches – subject verb agreement – active and passive voice - Impersonal Passive Voice.

Activity: Grammar worksheets on the given topics.

UNIT II LANGUAGE ENHANCEMENT THROUGH LISTENING & READING **9**

Syllabification - sentence stress – Reading Vocabulary-Reading News Papers -. Listening to You Tube Documentaries - Listening to Podcast - Listening to motivational Movies.

Activity: Playing video & TED and identifying stress and intonation.

UNIT III BUSINESS WRITING **9**

Writing Recommendations – Checklist – Business Letters – Calling for Quotations, Placing Orders, Letter of Complaint, Letter of Clarification – Cover Letter with Résumé – Report Writing – Accident Report, Industrial Visit Report, Survey Report and Feasibility Report.

Activity: Giving topic and ask the students to prepare checklist and complaint.

UNIT IV WRITING **9**

Transcoding Graphics – Bar Chart, Flow Chart, Pie Chart and Tables – Tour Itinerary – Process Description – Agenda and Minutes of meeting.

Activity: Giving charts to the students and ask them to transcode.

UNIT V SPEAKING **9**

Collaborative task – Turn taking (initiating and responding appropriately) – Negotiating – Exchanging – suggesting – comparing and contrasting – expressing – Finding out facts, attitudes and opinions – Commonly mispronounced words - Roleplay.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Acquire advanced level grammatical knowledge.
- Improve their language usage in LSRW skills.
- Enhance the writing skills to express the ideas in the business context
- Acquire the ability to understand different written texts.
- Categorize a wide range of vocabulary and English usage.

TEXT BOOKS

1. S. Sumant Maven ,"Technical English II",Vijay Nicole Publishers, 2011.
2. K.N Shoba ,LourdesJoavani Rayen, "Learning Communicative English", Cambridge University, 2017.

REFERENCES

1. Dr.K.Elango, Dr.Veena Selvam, Dr.Sujatha Priyadarshini, "Resonance English for Engineers and Technologists",Cambridge University Press, 1st Edition, Foundation Books,New Delhi, 2013.
2. Seely, John. Oxford, "Guide to Effective Writing and Speaking", Oxford University Press, 2005.

E – RESOURCES

1. https://www.fluentu.com/Blog/english/english-small-talk/
2. https://www.britishcouncil.com

19MAT201 **ENGINEERING MATHEMATICS – II** **L T P C**
(Common to all branches) **3 1 0 4**

OBJECTIVES

- To acquire sound knowledge of techniques in solving ordinary differential equations obtained from engineering problems.
- To acquaint the student with the concepts of vector calculus that is needed for problems in engineering disciplines.
- To develop the fundamental concepts in analytic functions, conformal mapping and Bilinear transformations.
- To extend the standard techniques of complex integration.
- To compose the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I DIFFERENTIAL EQUATIONS **9+3**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

UNIT II VECTOR CALCULUS **9+3**

Gradient and directional derivative – Divergence and curl – Line integral over a plane curve – Surface integral – Area of a curved surface – volume integral – Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTIONS **9+3**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by function $W = \frac{1}{z}$ – Bilinear transformation.

UNIT IV COMPLEX INTEGRATION **9+3**

Cauchy's integral theorem – Cauchy's integral formula – Laurent's series – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V LAPLACE TRANSFORMS **9+3**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems – Transforms of derivatives and integrals – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL : 45+15 = 60 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Apply various techniques in solving differential equations which arises in Engineering problems.
- Solve engineering problems using the concept of vector calculus.
- Develop the concept of analytic functions, conformal mapping and Bilinear transformations.
- Evaluate integrals using Cauchy's integral formula and residue theorem.
- Build the Laplace transforms techniques in solving differential equations.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015.

REFERENCES

1. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, Delhi, 10th Edition, New 2016.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.

E – RESOURCES

1. https://nptel.ac.in/courses/111105134/ (Vector Functions)
2. https://nptel.ac.in/courses/111106139/ (Complex Integration)

19CYT201 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
(Common to all branches) **3 0 0 3**

OBJECTIVES

- To explain the importance of the environment, concepts of ecosystem and overview of biodiversity and its conservation.
- To summarize the causes, effects and control of the various environmental pollution.
- To describe about natural resources and resource management.
- To assess the social issues to improve the quality of environment.
- To analyze the causes of population explosion, importance of value education and relation between human health and environment.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 11

Definition, scope and importance of environment – need for public awareness – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, rivers, oceans) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity – India as a mega-diversity nation – hot-pots of biodiversity – threats to biodiversity – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Activity: Biodiversity in and around the campus and report submission.

UNIT II ENVIRONMENTAL POLLUTION 9

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – e-waste – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake and cyclone.

Activity: Local Pollution Case Study and report submission.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources.

Activity: Waste to wealth.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9

From unsustainable to sustainable development – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – waste land reclamation – Green Chemistry and principles – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – Public awareness.

Activity: Creating Environmental Awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

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

Activity: Visit to local primary health center.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Discuss about the features of various ecosystems and need of conservation of biodiversity.
- Apply the appropriate methodologies to control the various environmental pollution.
- Get the knowledge about the different types of resources like land, water, mineral and energy and also about the effects of environment by the usage of these resources.
- Assess the social issues to improve the quality of environment and participating actively in solving current environmental problem.
- Find solution for the effects of the population explosion as well as environmental and human health issues.

TEXT BOOKS

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.

REFERENCES

1. ErachBharucha, 'Textbook of Environmental Studies', Universities Press(I) Pvt Ltd, Hydrabad, 2015.
2. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India Pvt Ltd, New Delhi, 2007.

E – RESOURCES

1. https://nptel.ac.in/courses/103107084
2. https://nptel.ac.in/courses/120108005

19PHT202 SOLID STATE PHYSICS AND NANOELECTRONIC DEVICES L T P C

(Common to II Semester CSE, ECE and EEE branches) **3 0 0 3**

OBJECTIVES

- To interrelate the basic conduction process in conducting materials.
- To differentiate the working concept semiconducting devices from other devices.
- To develop the knowledge in Superconducting and Dielectric materials.
- To make use of the light phenomenon in optical materials fabrication.
- To implement the knowledge of Nano Electronic Devices for future applications.

UNIT I CONDUCTING MATERIALS 9

Conductors – Classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law , Lorentz number – Draw backs of classical theory – Ohm"s law verification - Fermi Dirac distribution function – Effect of temperature on Fermi Function – Density of energy states – Carrier concentration in metal - Average energy of an electron. Effective mass of electron and Concept of hole

UNIT II SEMICONDUCTING MATERIALS 9

Elemental and compound semiconductors – Intrinsic semiconductor – Carrier concentration derivation – Fermi level – Derivation of carrier concentration in n-type and p-type semiconductor (Qualitative) – Hall effect and applications. - Working of PN junction diode – Schottky diode- Ohmic contacts- Tunnel diode.

UNIT III SUPERCONDUCTING AND DIELECTRIC MATERIALS 9

Superconductivity: Properties – Type I and Type II superconductors – BCS theory of superconductivity - High Tc superconductors – General applications of superconductors – Cryotron and Magnetic levitation. **Dielectric Materials**: Electrical susceptibility – Dielectric constant – Electronic, ionic, orientation and space charge polarization- Internal filed and Clausius-Mosotti Relation - Ferro electricity and applications

UNIT IV OPTICAL MATERIALS 9

Introduction-optical materials – Carrier generation and recombination processes –Solar cell – Photo detectors-PIN diode – Light Emitting Diode (LED) – Organic Light Emitting Diode (OLED) – Laser diode - Liquid Crystal Display (LCD) - Excitons- - Optical data storage techniques- Plasmonics.

UNIT V NANO ELECTRONIC DEVICES **9**

Introduction- Quantum confinement- Quantum well, quantum wire and quantum dot structure – Tunneling: single electron phenomena and single electron transistor (SET) – Quantum dot laser- quantum bits (qubits)- quantum computing- Carbon Nano Tubes (CNT) structure, properties and applications. Concepts of Molecular Transistor- Graphene Transistor – Carbon nano tube transistor - Applications of Nanodevices and Nanosensors.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Explain the nature of conducting materials and to calculate the parameters involved.
- Enhance basic concept of semiconductor, Hall effect, the principles of LED and photodiodes.
- Create, apply and disseminate knowledge leading to innovation Superconducting and Dielectric Materials.
- Acquire knowledge about optical Materials for advancement of applications.
- Grasp the basis of nanomaterials and their innovative uses to the human kind.

TEXT BOOKS

1. Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.
2. Rajendran V. "Engineering Physics". Tata McGraw Hill Publications, 2012.

REFERENCES

1. Garcia, N. & Damask, A. "Physics for Computer Science Students". Springer- Verlag,2012.
2. Hanson, G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2009.

E - RESOURCES

1. https://nptel.ac.in/downloads/122101002/
2. https://swayam.gov.in/nd1_noc19_ph14/preview

19GET203 BASIC CIVIL AND MECHANICAL ENGINEERING L T P C
(Common to CSE, ECE and EEE Branches) **3 0 0 3**

OBJECTIVES

- To familiarize the materials and measurements used in Civil Engineering.
- To provide the exposure on the fundamental elements of civil engineering structures.
- To enable the students to distinguish the components and working principle of power plant and pumps.
- To distinguish the components and working principle of IC engines and various sources of energy.
- To understand refrigeration and air condition system, manufacturing and fabrication techniques.

UNIT I CIVIL ENGINEERING MATERIALS AND SURVEYING 9

Role of civil engineering for the welfare of Society – Introduction – Bricks – stones – sand – cement – concrete – Necessity of special Concrete – steel – timber – modern materials – Surveying : Objects – Classification – Principles – Measurement of Distances – Angles – Leveling – Determination of Areas – Contours – Examples.

UNIT II BUILDING COMPONENTS AND STRUCTURES 9

Foundations: Soil – General types of soil –Types of foundations – Bearing capacity and settlement – Factors affecting bearing capacity – Requirement of good foundations – causes of failure of foundations. Civil Engineering Structures: Super structure:Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Types of Bridges and Dams – floor area, carpet area – Classification and purposes governing selection of site – Water supply – sources and quality of water – Rain water harvesting.

UNIT III POWER PLANT ENGINEERING 9

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro – electric and Nuclear Power plants – Merits and Demerits.

Pumps – working principle of Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps, Turbines – working principle of Impulse and reaction turbine.

UNIT IV IC ENGINES AND ALTERNATE SOURCES OF ENERGY 9

Internal combustion engines – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Automobile – important components and its functions. Alternate Energy sources – Solar energy, Wind energy, Tidal and Geothermal energy.

UNIT V AIR CONDITIONING AND MANUFACTURING TECHNOLOGY 9

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression – Layout of typical domestic refrigerator – Window and Split type room Air conditioner. Principle and applications of Metal forming process – Foundry, Forging and Metal joining process – Welding.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Know the various functions of Civil Engineer and to identify the suitable construction materials.
- Demonstrate the various elements of sub–structure and super–structure.
- understand the basic concepts in thermal engineering and fluid mechanics.
- Display the IC engine working principles of various energy sources.
- Exhibit an understanding of principles and applications of mechanical power transmission components and basic manufacturing process.

TEXT BOOKS

1. K.Venugopal, V.Praburaja, G,.Sreekanjana "Basic Civil and Mechanical Engineering" Anuradha Publications, Chennai, 2001.
2. Shanmugam.G and Palanichamy.MS, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co.,NewDelhi, 2018.

REFERENCES

1. Dr.B.C.Punmic, AshokeK.Jain, ArunK.Jain, "Basic Civil Engineering",Laxmi publications (P) LTD, New Delhi, 2008.
2. Shantha Kumar S R J., "Basic Mechanical Engineering", Hi–tech Publications.

E – RESOURCES

1. https://nptel.ac.in/courses/105/102/105102088/ (Functions of Buildings)
2. https://nptel.ac.in/courses/122/104/122104015/ (Engineering Mechanics)

19CSE201 **C PROGRAMMING** **L T P C**
(Lab Embedded Theory Course) **3 0 2 4**

OBJECTIVES

- To develop C Programs using basic programming constructs.
- To demonstrate C programs using arrays and strings.
- To know the applications in C using functions and pointers.
- To understand the structures and Unions.
- To construct input/output and file handling programs in C and perform read and write operations on file.
- To apply the practical knowledge through the various concepts in C.

UNIT I BASICS OF C PROGRAMMING **9**

Introduction to programming paradigms – Structure of C program – C programming: Data Types– variables–Storage classes – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions –Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Pre-processor directives – Compilation process.

UNIT II ARRAYS AND STRINGS **9**

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program**:** Computing Mean, Median and Mode – Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) – String operations: length, compare, concatenate, copy –Sorting – Selection sort, Insertion sort, Merge sort, quick sort – Searching – linear and binary search.

UNIT III FUNCTIONS AND POINTERS **9**

Introduction to functions: Function prototype, function call, Built–in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions – Pointers – Pointer operators – Arrays and pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT IV STRUCTURES **9**

Structure – Example Programs – Nested structures – Pointer in Structures – Array of structures – Example Program using structures and pointers – Self referential structures – Dynamic memory allocation.

UNIT V FILE PROCESSING **9**

Files – Operations of File – Types of file processing: Sequential access, Random access – Sequential access file – Random access file – Command line arguments.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Programs using I/O statements, expressions and decision–making constructs.
2. Write a program to find whether the given year is leap year or Not.
3. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of number.
4. Check whether a given number is Armstrong number or not?
5. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
    a) 5 if it is a perfect cube.
    b) 4 if it is a multiple of 4 and divisible by 6.
    c) 3 if it is a prime number.
6. Sort the numbers based on the weight in the increasing order as shown below
   <10,its weight>, <36,its weight><89,its weight>
7. Populate an array with height of persons and find how many persons are above the average height.
8. From a given paragraph perform the following using built–in functions:(i)Find the total number of words.(ii)Capitalize the first word of each sentence.(iii)Replace a given word with another word.
9. Solve towers of Hanoi using recursion.
10. Locate and Display the Contents of an Array using Pointers.
11. Generate salary slip of employees using structures and pointers.
12. Count the number of account holders whose balance is less than the minimum balance using sequential access file.

TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Develop C programs for simple applications making use of basic constructs,
- Implement C programs for simple applications making use of basic arrays and strings.
- Construct C programs involving functions, recursion and pointers
- Write C programs using structures.
- Design applications using sequential and random access file processing.
- Do problem solving by applying various programming methodologies.

TEXT BOOKS

1. E.Balagurusamy,"Programming in ANSI C", Tata McGraw Hill, 8th Edition, 2019.
2. Kernighan, B.W and Ritchie,D.M,"The C Programming language", 2nd Edition, Pearson Education, 2006.

REFERENCES

1. ReemaThareja, "Programming in C", Oxford University Press, 2nd Edition, 2016.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt.Ltd., 2011.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105085/ (Introduction to C Programming)
2. https://nptel.ac.in/courses/106/106/106106210/ (Stack Operations)

19EEC201 **TECHNICAL SKILL (MULTIMEDIA)** **L T P C**
(Employability Enhancement Course) **0 0 2 0**

OBJECTIVES

- To explore the various multimedia editing tools like Flash and Photoshop.
- To know about the multimedia software tools and can interact with multimedia practically.
- To know the animation techniques in Flash.
- To enable to understand layers in Photoshop.
- To enhance the skills to do image processing.
- To exploit animations and games.

LIST OF TECHNICAL SKILLS TO BE LEARNED

Flash:

1. To create an animation to represent the growing moon.
2. To create an animation to indicate a ball bouncing on steps.
3. To change a circle into a square using flash.
4. To display the background given(filename: tulip.jpg) through your name.
5. To draw the fan blades and to give proper animation.

Photoshop:

6. To Design a visiting card containing at least one graphic and text information.
7. To prepare a cover page for the book in your subject area. plan your own design.
8. To adjust the brightness and contrast of the picture so that it gives an elegant look.
9. To use appropriate tool(s) from the toolbox, cut the objects from 3 files.
   (f1.jpg, f2.jpg & f3.jpg); organize them in a single file and apply feather effects.
10. Apply crop, canvas and clone tools in an image.

TOTAL: 20 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Apply the tools on Photoshop.
- Create an application using Photoshop.
- Process the element using flash.
- Create animations.
- Understand the process of image processing.

SEMESTER III

19MAT301	**TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS** (Common to Civil, CSE, ECE, EEE &Mechanical)	**L T PC** **3 1 0 4**

OBJECTIVES

- To discover the basic concepts of Partial differential equation for solving standard partial differential equations.
- To apply the Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To explain Fourier transform techniques used in wide variety of situations.
- To utilize 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.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation of partial differential equations – Singular integrals – Solutions of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients of homogeneous types.

UNIT II FOURIER SERIES 9+3

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

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3

Classification of partial differential equations – 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) – Initial and final value theorems – Convolution theorem – Solution of difference equations using Z-transform.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Use the standard types of partial differential equations.
- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- Relate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
- Analyze some of the physical problems of engineering by Fourier transforms.
- Apply Z transforms techniques in solving difference equation.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.
2. Narayanan S., ManicavachagomPillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCES

1. N.P. Bali and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.
2. Erwin Kreyszig, "Advanced Engineering Mathematics",10th Edition, John Wiley,India,2016.

E – RESOURCES

1. https://nptel.ac.in/courses/111/105/111105035/(Fields and Matrices)
2. https://nptel.ac.in/courses/111/105/111105035/27(Complex Variables)

19CST301 **DATA STRUCTURES** **L T P C**
3 0 0 3

OBJECTIVES

- To understand the concepts of ADTs.
- To learn linear data structures – lists, stacks, and queues.
- To understand sorting algorithms.
- To apply Tree and Graph structures.
- To analyze searching and hashing techniques.

UNIT I LINEAR DATA STRUCTURES – LIST **9**

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists – circularly linked lists – doubly linked lists – applications of lists – Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES **9**

Stack ADT – Operations – Applications – Evaluating arithmetic expressions – Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Priority Queue – deQueue – applications of queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES **9**

Tree ADT – tree traversals – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees – AVL Trees – B-Tree – B+ Tree – Red-Black trees – Splay trees – Heap – Applications of heap.

UNIT IV NON LINEAR DATA STRUCTURES – GRAPHS **9**

Definition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Minimum Spanning Trees – Kruskal and Prim algorithm – Shortest path algorithm – Dijkstra"s algorithm – Floyd-Warshall algorithm. Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES **9**

Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort. Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Implement abstract data types for linear data structures.
- Apply the different linear and non-linear data structures to problem solutions.
- Identify the type of tree and understand various tree concepts.
- Apply the hashing techniques to organize memory
- Analyze the various searching algorithms.

TEXT BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education,1997.
2. ReemaThareja, "Data Structures Using C", 2ndEdition , Oxford University Press, 2011.

REFERENCES

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", 2nd Edition, Mcgraw Hill, 2002.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,1983.

E – RESOURCES

1. https://nptel.ac.in/courses/106/102/106102064/ (Introduction to Data Structures and Algorithms)
2. https://nptel.ac.in/courses/106/103/106103069/ (Searching and Sorting)

19CCT301 INFORMATION SECURITY FUNDAMENTALS L T P C
3 0 0 3

OBJECTIVES

- To understand the basics of Information Security.
- To recognize the legal, ethical and professional issues in Information Security.
- To identify the aspects of risk management.
- To aware of various standards in this area.
- To know the technological aspects of Information Security.

UNIT I INTRODUCTION 9

Information Security Basics, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues – An Overview of Computer Security – Access Control Matrix.

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk – Systems: Access Control Mechanisms.

UNIT IV LOGICAL DESIGN 9

Policy – Security policies, Confidentiality policies, Integrity policies and Hybrid policies.Security Standard: ISO 17799/BS 7799.

UNIT V : PHYSICAL DESIGN 9

Security Technologies: Intruders,Trusted Systems, Intrusion Detection Systems, Physical Security.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Discuss the basics of information security
- Illustrate the legal, ethical and professional issues in information security
- Demonstrate the aspects of risk management.
- Become aware of various standards in the Information Security System
- Design and implementation of Security Techniques.

TEXT BOOKS

1. Michael Whitman, Herbert J. Mattord, "Management of Information Security", 5th Edition, Course Technology, 2017.
2. William Stallings, "Network Security Essentials (Applications and Standards)",Pearson Education.

REFERENCES

1. Stuart McClure, Joel Scrambray, George Kurtz, "Hacking Exposed",TataMcGraw–Hill, 2003.
2. Matt Bishop,"Computer Security Art and Science", Pearson/PHI, 2002.

E–RESOURCES

1. https://nptel.ac.in/courses/106/106/106106129/(Information Security Technologies)
2. http://www.nptelvideos.com/course.php?id=427 (Information Security)

19ECT302 ANALOG AND DIGITAL COMMUNICATION L T P C
3 0 0 3

OBJECTIVES

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio–economic impact and issues.
- To study the various analog and digital modulation techniques.
- To understand the principles behind information theory and coding.
- To study the various digital communication techniques.
- To familiarize with Information coding Techniques.

UNIT I ANALOG MODULATION 9

Amplitude Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and demodulators – Angle modulation – PM and FM – PSD, modulators and demodulators – Superheterodyne receivers.

UNIT II PULSE MODULATION 9

Low pass sampling theorem – Quantization – PAM – Line coding – PCM, DPCM, DM, and ADPCM And ADM, Channel Vocoder– Time Division Multiplexing, Frequency Division Multiplexing.

UNIT III DIGITAL MODULATION AND TRANSMISSION 9

Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers.

UNIT IV INFORMATION THEORY AND CODING 9

Measure of information – Entropy – Source coding theorem – Shannon-Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding.

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS 9

PN sequences – properties – m-sequence – DSSS – Processing gain, Jamming – FHSS – Synchronization and tracking – Multiple Access – FDMA, TDMA, CDMA.

TOTAL : 45 PERIODS

OUTCOMES

Upon Completion of the course, Students will be able to:

- Comprehend and appreciate the significance and role of this course in the present contemporary world.
- Apply analog and digital communication techniques.
- Use data and pulse communication techniques.
- Analyze Source and Error control coding.
- Know about information coding techniques.

TEXT BOOKS

1. H Taub, D L Schilling, G Saha, "Principles of Communication Systems", 3rd Edition, TMH 2007.
2. S. Haykin,"DigitalCommunications",John Wiley, 2005.

REFERENCES

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd Edition, Oxford University Press, 2007.
2. H P Hsu,"Analog and Digital Communications", Schaum Outline Series,TMH, 2006.

E– RESOURCES

1. https://nptel.ac.in/courses/117/105/117105143/(FourierSeries).
2. https://nptel.ac.in/courses/117/102/117102059/(Communication Engineering)

19CSE301 OBJECT ORIENTED PROGRAMMING L T P C
3 0 2 4

OBJECTIVES

- To understand the Concept of Object Oriented Programming
- To impart the knowledge of java fundamentals.
- To understand Inheritance and interfaces.
- To apply the concepts of exception handling.
- To write Programs using multithreading and Understand emerging trends of Generic Programming.
- To apply OOPs concepts in java applications.

UNIT I OVERVIEW 9

Object Oriented Programming – Abstraction – objects and classes – Encapsulation – Inheritance – Polymorphism – Data Hiding and Member Functions – Object Creation and Destruction – OOPs in Java – Characteristics of Java – The Java Environment –Java Source File Structure – Compilation.

UNIT II JAVA FUNDAMENTALS 9

Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods – access specifiers – static members – Comments, Data Types, Variables,Operators, Control Flow, Arrays , Packages – JavaDoc comments.

UNIT III 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 IV EXCEPTION HANDLING AND I/O 9

Exceptions – exception hierarchy – throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT V 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.

LIST OF EXPERIMENTS

(Any Eight Experiments to be Conducted)

1. Write a Java program to check whether the given string is palindrome or not.
2. Develop a Java application to generate Electricity bill.
3. Develop a java application to implement currency converter using packages
4. Design a Java interface for ADT Stack. Implement this interface using array.
5. Write a program to perform string operations using ArrayList.
6. Write a Java program to implement user defined exception handling.
7. Write a java program that implements a multi–threaded application.
8. Write a java program to find the maximum value from the given type of elements using a generic function.
9. Develop a mini project for any application using Java concepts.

TOTAL : 45+15 = 60 PERIODS

OUTCOMES

Upon completion of course, Students will be able to:

- Gain the basic knowledge on Object Oriented concepts.
- Develop the applications using Java.
- Understand Inheritance and interfaces.
- Implement concepts of exception handling in program.
- Implement Multithreading concepts in real time environment and Apply Generic Programming.
- Apply the concepts to produce solutions for various problems.

TEXT BOOKS

1. Herbert Schildt, "Java The complete reference", 8th Edition, McGraw Hill Education, 2011.
2. Cay S. Horstmann, Gary cornell, "Core Java Volume – I Fundamentals", 9thEdition, Prentice Hall, 2013.

REFERENCES

1. Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.
2. Steven Holzner, "Java 2 Black book", Dreamtech press, 2011.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105153/ (Challenges in OOPS)
2. https://nptel.ac.in/courses/106/105/106105191/ (Programming in Java)

19ECE301 DIGITAL ELECTRONICS L T P C
3 0 2 4

OBJECTIVES

- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions.
- To introduce the methods for simplifying Boolean expressions.
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits.
- To introduce the concept of memories and programmable logic devices.
- To illustrate the concept of synchronous and asynchronous sequential circuits.
- Todesign combinational circuits using basic gates.

UNIT I DIGITAL FUNDAMENTALS 9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.

UNIT II COMBINATIONAL CIRCUIT DESIGN 9

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Verilog HDL for combinational circuits.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters – Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits, ASM chart.

UNIT V MEMORY DEVICES AND DIGITAL INTEGRATED CIRCUITS 9

Basic memory structure –ROM – PROM – EPROM – EEPROM –EAPROM, RAM – Static and dynamic RAM – Programmable Logic Devices – Programmable Logic Array (PLA) –Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) – Implementation of combinational logic circuits using PLA, PAL.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Verification of Boolean theorems using digital logic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4–bit binary adder / subtractor using basic gates and MSI devices.
4. Design and implementation of parity generator / checker using basic gates and MSI devices.
5. Design and implementation of magnitude comparator.
6. Design and implementation of application using multiplexers/ demultiplexers
7. Design and implementation of Shift registers.
8. Design and implementation of Synchronous and Asynchronous counters
9. Simulation of combinational circuits and sequential circuits using Hardware Description Language (VHDL/Verilog HDL software required)
10. Design and implementation of a simple digital system (Mini Project).

TOTAL:45+15=60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Analyze different methods used for simplification of Boolean expressions.
- Design and implement Combinational circuits.
- Design and implement synchronous and asynchronous sequential circuits.
- Write simple HDL codes for the circuits.
- Understand the concepts of memory.
- Design combinational circuits and simple digital system using basic gates.

TEXT BOOKS

1. M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to theVerilog HDL, VHDL, and System Verilog", 6thEdition, Pearson Education, 2017.
2. David Harris ,"Digital Design and Computer Architecture", Morgan Kaufmann,2012.

REFERENCES

1. G. K. Kharate, "Digital Electronics", Oxford University Press, 2010.
2. John F. Wakerly,"Digital Design Principles and Practices", 5th Edition, Pearson Education, 2017.

E – RESOURCES

1. https://nptel.ac.in/courses/117/106/117106086/ (Digital Design)
2. https://nptel.ac.in/courses/108/105/108105132/ (Integrated Circuits)

19EEC301 **COMMUNICATION SKILLS** **L T P C**
0 0 2 0

OBJECTIVES

- To improve fluency in English through well developed vocabulary.
- To develop the oral communication skills.
- To focus the effective reading of general and technical text.
- To enrich writing skill.
- To communicate ideas in group discussion and interviews.

UNIT I VOCABULARY **6**

Vocabulary building – articulate ideas and thoughts; usage of palindromes,greetings, wishes, festival related words – homophones and homonyms – connotation – vocabulary words with sentences. – Idiomatic Expressions – One-word Substitutes.

Activities: Learn a word a week, Use newspaper to write unfamiliar words, Word association games.

UNIT II LISTENING **6**

Listening Skill – Its importance – Purpose – Process– Types – Barriers – Effective Listening strategies – Listening to telephonic conversations – Ted talks – Watching Inspiring Speech videos on You tube – Listening native speaker's videos for pronunciation- Listening to broadcast, messages, announcements - Listening to Instagram Videos.

Activities:Listen and draw the different scenes in a story, Secret Message games,watching videos and listing difficult words.

UNIT III SPEAKING **6**

JAM Talk – Role play – Debate – Conversational skills (formal and informal) – Conversation practice – group discussion and interview skills – Introducing oneself and others – Presentation skills – Making presentations (individual and group) through seminars / PPTs.

Activities:Picture Description, Giving Directions and Guidelines, Making a short speech – Extempore.

UNIT IV READING **6**

Strategies for effective reading (Guessing meanings from contexts – Scanning, skimming, inferring meaning and critical reading) – Read and recognize different text types ranging from newspaper articles, magazines, books, Technical articles and Reading autobiographies.

Activities: Reading online sources like e-books, e-journals and e-newspapers,cloze exercises, Reading and answering questions.

UNIT V WRITING **6**

Develop a paragraph: topic sentence, supporting sentences, concluding sentence – Writing simple Essays – argument, descriptive and comparative essays – Creative writing.

Activities:Write Essays with sub titles,Write a story that uses as many clichés and idioms, Write Paragraph.

TOTAL : 30 PERIODS

The following Practice Session will be conducted for the Communication Skills (CS) Lab sessions:

- Activities on Presentations Skills – Students make presentations on given topics.
- Activities on Group Discussion – Students participate in group discussions.
- Interview Skills – Students participate in Mock Interviews.
- Essay Writing – Students prepare their own paragraph and essay.

Guidelines for conducting assessments as per 2019 regulations

- 30 hours – Two consecutive hours allotted for each class.
- Three Continuous assessments only conducted and no end semester exam.
- For the award of Continuous assessment the best three activities from Essay Writing, Oral Presentation, Extempore,Group Discussion and Mock Interview (one –on – one basis) can be taken.

OUTCOMES

Upon completion of the course, Students will be able to:

- Improve vocabulary and express the same contextually.
- Comprehend the general and technical text.
- Communicate to his peer group properly and make presentations.
- Write simple paragraph and essay in any topic.
- Participate in group discussions expressing ideas relevantly, coherently and cogently.

TEXT BOOKS

1. Gramer F. Margot and Colin S. Ward,"Reading and Writing (Level 3)", Oxford University Press: Oxford, 2011
2. Brooks,Margret,"Skills for Success. Listening and Speaking. Level 4", Oxford University Press, Oxford, 2011

REFERENCES

1. Davis, Jason and Rhonda LIss,"Effective Academic Writing (Level 3)", Oxford University Press: Oxford, 2006.
2. E. Suresh Kumar and et al.,"Enriching Speaking and Writing Skills",2nd Edition,Orient Black swan.

E – RESOURCES

1. www.youglish.com (Introduction)
2. www.Newwellington University.com (Reading and Writing Skills)

19MDC301 **LEADERSHIP ENHANCEMENT PROGRAMME** **L T P C**
(Common to Civil,CSE,ECE,EEE & Mechanical) **1 0 0 0**

OBJECTIVES

- To find new, innovative ways of developing and managing people.
- To develop new business opportunities.
- To tackle the broader societal issues the face.
- To key benefits of leadership skills in different situations.
- To formulate and implement effective leadership strategies.

TOPICS TO BE COVERED

1. Leadership for an Engineering students: Skills & Strategies.
2. Qualities of good leaders and 21 irrefutable laws of Leadership.
3. Empowering Others and Managing People.
4. Leading Meetings.
5. Leadership competencies and Leadership Styles.
6. Difference between a boss and a leader.
7. Leadership and Assertiveness Skills : A Good Leader, Leadership Theories, Leadership Behaviour , Assertiveness skills.
8. Leadership development opportunities and suggestions.
9. Teamwork and Leadership : Concept of teams , Building Effective teams, Concept of leadership and sharpening leadership skills.
10. Teamwork and Leadership Activities : Group discussion, Solving Puzzle as a team, describing a leadership style.

TOTAL : 12 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Develop the capabilities needed to increase team's work productivity.
- Help to decrease employee turnover and increase engagement, creating a strong and united team.
- Develop communication skills, mastering the art of negotiation, influence and conflict management.
- More confident as a leader and find new ways of influencing the teams they lead.
- Effectively connect to people, developing the ability to give constructive feedback, and critically seek the feedback of the team.

TEXT BOOKS

1. John maxwell, "21 Irrefutable Laws of Leadership", 2008.
2. Louis carter ,Davidulrich , Marshall goldsmith,"Best practices in leadership development and Organization change".

REFERENCES

1. Barry Benator, Albert Thumann,"Project Management and Leadership Skills for Engineering and Construction Projects", 2003.
2. Sydänmaanlakka, Pentti. "Intelligent leadership and leadership competencies". Dissertation Series.

E– RESOURCES

1. https://nptel.ac.in/courses/122/105/122105021/(Introduction to Leadership)
2. www.ccl.org/leadership/research/index.aspx.(Leadership and Assertive Skills)

SEMESTER IV

19MAT401 PROBABILITY AND QUEUEING THEORY L T P C
3 1 0 4

OBJECTIVES

- To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of Science and Engineering.
- To distinguish one and two dimensional random variables and to introducing some standard distributions.
- To solve the concepts of random processes which are widely used in IT fields.
- To apply the concept of queuing models in engineering and the real life situations.
- To describe the significance of advanced queuing models.

UNIT I PROBABILITY AND RANDOM VARIABLES 9+3

Probability – Axioms of probability – Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II TWO – DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES 9+3

Classification – Stationary process – Markov process – Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT IV QUEUEING MODELS 9+3

Markovian queues – Birth and death processes – Single and multiple server queueing models – Little's formula – Queues with finite waiting rooms – Queues with impatient customers : Balking and reneging.

UNIT V ADVANCED QUEUEING MODELS 9+3

Finite source models – M/G/1 queue – PollaczekKhinchin formula – M/D/1 and $M/E_K/1$ as special cases – Series queues – Open Jackson networks.

TOTAL : 45+15 = 60 PERIODS

OUTCOMES

Upon completion of this course, Students will be able :

- concepts and to solve the standard distributions which can describe real life phenomenon.
- Distinguish the one and two dimensional random variables and apply in engineering applications.
- Analyze the concept of random processes in engineering disciplines.
- Acquire skills in analyzing queueing models.
- Solve characterize phenomenon which evolve with respect to time in a probabilistic manner.

TEXT BOOKS

1. Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M, "Fundamentals of Queueing Theory", Wiley Student, 4th Edition, 2014.
2. Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007.

REFERENCES

1. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.
2. Taha,H.A., "Operations Research",9th Edition, Pearson India Education Services, Delhi, 2016.

E–RESOURCES

1. https://nptel.ac.in/courses/111/106/111106053/ (Review of Set Theory)
2. https://swayam.gov.in/nd1_noc19_ma22/preview (Higher Engineering Mathematics)

19CST302 COMPUTER ORGANIZATION AND ARCHITECTURE L T P C
3 0 0 3

OBJECTIVES

- To learn the basic structure and operations of a computer.
- To elaborate the arithmetic and logic unit and implementation of fixed–point and floating point arithmetic unit.
- To study the concepts of pipelining.
- To understand the nano programming concepts.
- To learn the hierarchical memory system including cache and virtual memories.

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Hardware – Software Interface – Instruction set architecture – Addressing modes – RISC – CISC. ALU design – Fixed point and floating point operations.

UNIT II ARITHMETIC FOR COMPUTERS 9

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism.

UNIT III BASIC PROCESSING UNIT 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Nano programming.

UNIT IV PIPELINING 9

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

UNIT V MEMORY I/O ORGANIZATION 9

Cache memories – Improving cache performance – Virtual memory – Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Understand the basics structure of computers, operations and instructions.
- Implement pipelined execution and design control unit.
- Elaborate parallel processing architectures.
- Apply the DMA Concepts in I/O Communications.
- Learn the Nano Programming Techniques.

TEXT BOOKS

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and NaraigManjikian,"Computer Organization and Embedded Systems", 6th Edition, Tata McGraw Hill, 2014.
2. M.Morris Mano, "Computer System Architecture", 3rd Edition, McGraw Hill Reprint, 2012.

REFERENCES

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", 8th Edition, Pearson Education, 2010.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", 3rd Edition, Elsevier, 2005.

E – RESOURCES

1. https://nptel.ac.in/courses/106/103/106103068/ (Representation of Information)
2. https://nptel.ac.in/courses/106/105/106105163/ (Evolution of Computer Systems)

19CCT401 MODERN CRYPTOGRAPHY L T P C
3 1 0 4

OBJECTIVES

- To learn the OSI security architecture.
- To enrich the symmetric cipher techniques.
- To understand asymmetric cipher techniques.
- To identify message authentication, Hash and Digital Signatures.
- To acquaint knowledge about cryptography in embedded hardware.

UNIT I INTRODUCTION 9

Cryptography and modern cryptography – Setting of private-key encryption – Historical ciphers and their cryptanalysis – Basic principles of modern cryptography – Services, Mechanisms and Attacks – OSI security architecture.

UNIT II SYMMETRIC TECHNIQUES 9

Definition – Substitution ciphers – Transposition ciphers - Stream and block ciphers - A5, RC4 - Characteristics of good ciphers - Data Encryption Standard (DES) – International Data Encryption Algorithm – Advanced Encryption Standard – Block cipher modes of operation – Confidentiality using symmetric encryption.

UNIT III ASYMMETRIC TECHNIQUES 9

Principles of Public Key Cryptosystems – The RSA Algorithm – Key Management – Diffie Hellman Key Exchange – Elliptic Curve Cryptography – Prime fields and binary fields, Applications, Practical considerations. Cryptography in Embedded Hardware.

UNIT IV MESSAGE AUTHENTICATION 9

Authentication requirements – Authentication functions – Message Authentication Codes (MAC) – Hash functions – Security of hash functions and MACs.

UNIT V HASH AND DIGITAL SIGNATURES 9

MD5 Message Digest Algorithm – Secure Hash Algorithm (SHA) –RIPMED160 - HMAC - Digital Signatures – Authentication Protocols – Digital Signature Standard (DSS).

OUTCOMES

Upon completion of the course, Students will be able to:

- Analyze the attacks.
- Understand the symmetric cipher.
- Implement asymmetric cipher techniques.
- Apply the algorithm for Message Authentication, Hash and Digital Signatures.
- Acquaint Knowledge about cryptography in embedded software.

TEXT BOOKS

1. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, New Delhi, 2006.
2. William Stallings, "Cryptography and Network Security", Prentice Hall, New Delhi, 2006.

REFERENCES

1. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, New Delhi, 2010.
2. Jonathan Katz, Yehuda Lindell,"Introduction to Modern Cryptography", Chapman & Hall/CRC, New York, 2007.

E – RESOURCES

1. https://onlinecourses.nptel.ac.in/noc20_cs21/preview (Introduction)
2. http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html(Cipher Text)

19CST403 SOFTWARE ENGINEERING L T P C
3 0 0 3

OBJECTIVES

The main objective of this course is to,

- To provide the understandings of the software engineering.
- To familiar with prototyping techniques for requirement engineering process.
- To address the design levels of software engineering.
- To develop the system from the scratch.
- To verify and validate the software.

UNIT I INTRODUCTION 9

Introduction – S/W Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) – system engineering – computer based system – verification – validation – life cycle process – development process – system engineering hierarchy.

UNIT II PROJECT MANAGEMENT 9

Project Management Concepts – Software Project Planning Risk analysis and management project scheduling and tracking – Software Quality Assurance – Software configuration management

UNIT III REQUIREMENT ANALYSIS 9

Functional and non-functional – user – system – Requirement Engineering process – feasibility studies – requirements elicitation – Validation and Management – Software Prototyping – Prototyping in the software process – rapid prototyping techniques – user interface prototyping – S/W document. Analysis and modeling – Data, Functional and Behavioural models – Structured Analysis and Data Dictionary.

UNIT IV DESIGN AND DEVELOPMENT 9

Design process and concepts – Modular design – Design heuristic – Design model and document. Architectural design – Data design – Architectural design – Transform and transaction mapping – User interface design – Component level design. Real time systems – Real time software design – System design – Introduction to Agility – Agile process – Extreme programming – XP Process.

UNIT V TESTING AND MAINTENANCE **9**

Taxonomy of software testing – levels – Black box testing – Testing boundary conditions – Structural testing – Test coverage criteria based on data flow mechanisms – Unit testing – Integration testing – Validation testing – system testing and debugging.Software Implementation Techniques: Coding practices – Refactoring – Maintenance and Reengineering – BPR model – Reengineering process model – Reverse and Forward Engineering.

TOTAL :45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explore the strength and weakness of various life cycle models.
- Identify the functional and non–functional requirements for the project.
- Develop the project using lifecycle models.
- Understand the concepts of Agile.
- Verify and validate the software using different types of testing.

TEXT BOOKS

1. Roger Pressman.S, "Software Engineering : A Practitioner's Approach", 7th Edition, McGraw Hill, 2010.
2. Ian Sommerville,"Software Engineering ", 9th Edition, Pearson Education Asia, 2011.

REFERENCES

1. S.A. Kelkar, "Software Engineering, A Concise Study", Prentice Hall of India,2007
2. Carlo Ghezzi, MehdiJazayeri and Dino Mandrioli, "Fundamentals of Software Engineering", 2nd Edition, Prentice Hall of India, 2003.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105182/ (Software Models)
2. https://nptel.ac.in/courses/106/105/106105087/ (Structured Programming)

19CSE401 DATABASE MANAGEMENT SYSTEMS L T P C
3 0 2 4

OBJECTIVES

- To learn the fundamentals of data models and to represent a database system using ER diagrams.
- To study SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DBdesign.
- To understand the fundamental concepts of transaction processing– concurrency control techniques and recoveryprocedures.
- To acquire knowledge about the Storage and Query processing Techniques.
- To provide a practical knowledge about various commands and procedures in a RDBMS.

UNIT I RELATIONAL DATABASES 10

Introduction :Database System Application – Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Embedded SQL– Dynamic SQL.

UNIT II DATABASE DESIGN 9

Entity-Relationship model – E-R Diagrams – Enhanced E-R Model – ER Design Issues – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms BoyceCoddNormal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT III TRANSACTIONS 9

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

UNIT IV IMPLEMENTATION TECHNIQUES 8

Overview of Physical Storage Media – Magnetic Disks – RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Measure the Cost Estimation.

UNIT V ADVANCED TOPICS **9**

Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features – XML Databases: XML Hierarchical Model, purpose of XML – Information Retrieval: IR Concepts and Advantages.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements.
2. Implement Relational model to entitle an strong and weak entities.
3. Database Querying – Simple queries, Nested queries, Sub queries and Joins.
4. Views, Sequences, Synonyms.
5. Database Programming: Implicit and Explicit Cursors.
6. Procedures and Functions.
7. Triggers.
8. Exception Handling.
9. Database Design using ER modeling, normalization and Implementation for any application.
10. Database Connectivity with Front End Tools.
11. Case Study using real life database applications.

TOTAL : 45+15 = 60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Use typical data definitions and manipulation commands.
- Design applications to test Nested and Join Queries.
- Implement simple applications that use Views.
- Implement applications that require a Front–end Tool.
- Analyze the use of Tables, Views, Functions and Procedures.
- Gather a practical knowledge about various commands and procedures in a RDBMS.

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th Edition, Tata McGraw Hill, 2011.
2. Ramez Elmasri,ShamkantB.Navathe,"Fundamentals of Database Systems", 6th Edition, Pearson Education, 2011.

REFERENCES

1. C.J.Date,A.Kannan,S.Swamynathan,"An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, "Database Management Systems", 4th Edition, McGraw–Hill College Publications, 2015.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105175/ (Introduction to DBMS)
2. https://nptel.ac.in/courses/106/106/106106093/ (Conceptual Designs)

19CCE401 OPERATING SYSTEMS L T P C
3 0 2 4

OBJECTIVES

- To understand the basic concepts and functions of operating systems.
- To know Processes, Threads and to analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and Filesystems.
- To understand the basic shell commands and various scheduling algorithms

UNIT I OPERATING SYSTEM OVERVIEW 9+3

Computer System Overview – Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. 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.

UNIT II PROCESS MANAGEMENT 9+3

Processes – Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; 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 fromdeadlock.

UNIT III STORAGE MANAGEMENT 9+3

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+3**

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface – File concepts, 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+3**

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, FileSystem.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

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 implement the various CPU Scheduling Algorithms.
4. Implementation of Shared memory and IPC.
5. Bankers Algorithm for Deadlock Avoidance.
6. Implementation of Deadlock Detection Algorithm.
7. Write C program to implement Threading & Synchronization Applications
8. Implementation of the following Memory Allocation Methods for fixed partition
   a. First Fit b) Worst Fit c) Best Fit
9. Implementation of Paging Technique of Memory Management
10. Implementation of the following Page Replacement Algorithms
    a. FIFO b) LRU c) LFU

.TOTAL : 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to,

- Analyze various scheduling algorithms.
- Understand deadlock prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Understand the functionality of file systems.
- Understand the advanced operating systems.
- Understand and implement various scheduling algorithms on OS

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,"Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.
2. Harvey M. Deitel, "An introduction to Operating Systems",3rd Edition, Addison–Wesley,2007.

REFERENCES

1. RamazElmasri,A.GilCarrick, David Levine,'Operating Systems–A Spiral Approach", Tata McGraw Hill Edition,2010.
2. AndrewS.Tanenbaum,"Modern Operating Systems", 2ndEdition, Pearson Education, 2004.

E–RESOURCES

1. https://nptel.ac.in/courses/106/105/106105214/(Introduction to Operating Systems)
2. https://nptel.ac.in/courses/106/102/106102132/(System Calls)

19EEC302 ENTREPRENEURSHIP DEVELOPMENT ACTIVITY L T P C
(Common to Civil,CSE,ECE,EEE& Mechanical) **0 0 2 0**

OBJECTIVES

- To evaluate social and civil responsibilities of business ownership.
- To describe typical behavioral characteristics of an effective entrepreneur.
- To develop a business plan, including identifying an executive summary; conducting a marketing and competitive analysis report; and developing a marketing, management, and financial plan.
- To determine career opportunities, responsibilities, and educational and credentialing requirements related to various entrepreneurship ventures.
- To interpret research data to determine market–driven problems faced by entrepreneurs.

TOPICS TO BE COVERED

1. Should You Become an Entrepreneur?
   - Entrepreneurship: Present & Past
   - Is Entrepreneurship Right for You
   - Identify Business Opportunities & Set Goals
2. What Skills Do Entrepreneurs Need
   - Communication Skills
   - Math Skills
   - Problem Solving Skills
3. Entrepreneurs in a Market Economy
   - What is an Economy?
   - The Concept of Cost
   - Government in a Market Economy
4. Select a Type of Ownership
   - Run an Existing Business
   - Own a Franchise or Start a Business
   - Choose the Legal Form of Your Business
5. Develop a Business Plan
   - Why Do You Need a Business Plan

- What Goes into a Business Plan
- Create an Effective Business Plan

6. Identify and Meet a Market Need
   - The Value of Market Research
   - How to Perform Market Research Entrepreneurship Syllabus
   - Identify Your Competition
7. Finance, Protect, and Insure Your Business
   - Put Together a Financial Plan
   - Obtain Financing for Your Business
   - Protect Your Business
8. Choose Your Location & Set Up for Business
   - Choose a Retail Business Location
   - Choose a Location for a Nonretail Business
   - Obtain Space and Design the Physical Layout
   - Purchase Equipment, Supplies, and Inventory
9. Market Your Business
   - The Marketing Mix
   - Product, Price, Distribution, Price, and Promotion
   - Set Marketing Goals
10. Hire and Manage a Staff
    - Hire Employees
    - Create a Compensation Package
    - Manage your Staff
11. Record–Keeping and Accounting
    - Set up a Record Keeping System
    - Understand Basic Accounting
    - Track Your Inventory
12. Financial Management
    - Manage your Cash Flow
    - Analyze Your Financial Performance
    - Hire Experts

13. Use Technology
    - Technology and Your Business
    - Learn about the Interest
    - Purchase Technology
14. Intellectual property Rights
    - Patents
    - Copyright
    - Industrial design rights
    - Trademarks
    - Trade secrets
15. Innovation Contest
    - Innovative Idea
    - Proof of Concept (PoC)
    - Prototype Creation

The students may be grouped into 2 to 3

TOTAL: 15 PERIODS

Outcomes

Upon completion of the course, Students will be able to:

- Identify personal strengths and value systems.
- Recall important tenets of digital literacy.
- Discuss the essentials of matters pertaining to money.
- Prepare for employment and self-employment.
- Illustrate the basics of entrepreneurship and identify new business opportunities.

19MDC402	VALUE ADDED COURSE – I (ETHICAL HACKING)	L T P C - - - -

OBJECTIVES

- To explore the various hacking techniques in a network.
- To know about the databases available for hacking.
- To enhance the knowledge in virus analysis.
- To exploit the ethical hacking in social engineering.
- To learn the ways of IP Spoofing.

COURSE CONTENTS

1. Cyber Ethics-Hacking Introduction
2. Scanning
3. Google Hacking Database
4. Virus, Worms – Virus Analysis
5. Trojans & Backdoors
6. Sniffers & keyloggers
7. Social Engineering
8. Email, DNS, IP spoofing

OUTCOMES

Upon completion of the course, Students will be able to:

- Understand the various hacking techniques in a network.
- Know about the databases available for hacking.
- Enhance the knowledge in virus analysis.
- Exploit the ethical hacking in social engineering.
- Learn the ways of IP Spoofing.

SEMESTER V

19MAT501 MATHEMATICAL FOUNDATIONS FOR CYBER SECURITY LT P C

3 1 0 4

OBJECTIVES

- To provide fundamental concept of number theory.
- To familiarize the students with classical theorems and multiplicative functions.
- To apply induction and counting techniques in combinatory area.
- To produce the knowledge of graph theory.
- To familiarize the applications of algebraic structures and coding theory.

UNIT I DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS 9+3

Division algorithm – Base – b representations – Number patterns – Prime and composite numbers – GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM.

UNIT II CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS 9+3

Wilson 's theorem – Fermat 's little theorem – Euler 's theorem – Euler 's Phi functions – Tau and Sigma functions.

UNIT III INDUCTION AND COUNTING 9+3

Mathematical induction – Strong induction and well-ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Binomial coefficients – Generating functions – Inclusion and exclusion principle.

UNIT IV GRAPHS 9+3

Graphs and graph models – Graph terminology and special types of graphs – Representing Graphsand Graph Isomorphism – Euler and Hamilton paths – Trees: Introduction to Trees.

UNIT V ALGEBRAIC STRUCTURES AND CODING THEORY 9+3

The Structure of Algebras – Semi groups, monoids and Groups – Cosets and Lagrange 's theorem – Coding theory: Minimum distance, error correction and Detection – Maximum likelihood decoding and maximum distance decoding – Decoding in group codes – Hamming codes.

TOTAL: 45+15 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Apply integrated approach to number theory.
- Develop classical theorems and multiplicative functions ideas.
- Apply the basic concepts of induction and counting techniques in combinatorics area.
- Discover the knowledge of graph theory.
- Classify the concepts of algebraic structures and coding theory.

TEXTBOOKS

1. Koshy.T, "Elementary Number Theory with Applications", 2nd Edition, Elsevier Publications, NewDelhi, 2012.
2. Kenneth H Rosen, "Discrete Mathematics and its Applications", 7th Edition, McGraw Hill Education(India) Private Ltd., New Delhi, Special Indian Edition, 2011.

REFERENCES

1. Ralph P Grimaldi and B.V Ramana., "Discrete and Combinatorial Mathematics: An AppliedIntroduction", 5th Edition, Pearson Education limited, 2014.
2. Satinder Bal Gupta., "Discrete Mathematics and Structures", University science press, New Delhi, 5th Edition, 2012.

E-RESOURCES

1. https://archive.nptel.ac.in/courses/111/101/111101137/ (Number theory)
2. https://nptel.ac.in/courses/106106183 (Discrete Mathematics)

19CST501 ARTIFICIAL INTELLIGENCE L T P C

3 0 0 3

OBJECTIVES

- To understand the various characteristics of intelligent systems.
- To learn different search methods in Artificial Intelligence.
- To learn representation of knowledge in solving AI problems.
- To know the different ways of designing software agents.
- To know about the various applications of AI.

UNIT I INTRODUCTION 9

Introduction – Definition – Characteristics of intelligent agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI Problems.

UNIT II SEARCH METHODS FOR PROBLEM SOLVING 9

Problem Solving Methods – Search Strategies – Informed – Uninformed – Heuristics – Local Search Algorithms – Constraint Satisfaction Problems – Game Playing – Alpha-Beta Pruning.

UNIT III KNOWLEDGE REPRESENTATIONS 9

Propositional Logic – First Order Logic (FOL) – Reasoning in FOL – Resolution in FOL – Forward and Backward Chaining – Categories and Objects – Events – Reasoning System for Categories.

UNIT IV SOFTWARE AGENTS 9

Architecture for Intelligent Agents – Agent Communication - Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-Agent Systems.

UNIT V APPLICATIONS 9

AI Applications – Language Models – Information Retrieval and Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robotics.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Study the software architecture and its quality attributes.
- Use appropriate search algorithm for any AI problems.
- Represent a problem using Propositional and First Order Logic.
- Design software agents to solve a problem.
- Design various applications that use Artificial Intelligence.

TEXT BOOKS

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", 4th Edition, Prentice Hall, 2020.
2. M.Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", 1st Edition, Jonesand Bartlett Publishers, Inc., 2012.

REFERENCES

1. Gerhard Weiss, "Multi Agent Systems", 2nd Edition, MIT Press, 2013.
2. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents",1st Edition, Cambridge University Press, 2010.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105077 (Uninformed Search)
2. https://nptel.ac.in/courses/106/106/106106126 (Propositional and First Order Logic)

19CST602 **COMPILER DESIGN** **L T P C**

3 1 0 4

OBJECTIVES

- To understand the language hierarchy.
- To construct automata for any given pattern and find its equivalent regular expressions.
- To understand intermediate code generation and run-time environment.
- To learn to implement code generator.
- To understand various code optimization algorithms.

UNIT I AUTOMATA FUNDAMENTALS **9**

Introduction to formal proof – Additional forms of Proof – Inductive Proofs – Memory required to recognize a Language – Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions – Minimal Finite Automata.

UNIT II REGULAR EXPRESSION AND REGULAR LANGUAGES **9**

Regular Languages and Regular Expressions – Kleene's Theorem – Pumping Lemma for Regular Languages – FA and Regular Expressions – Proving Languages not to be regular– Closure Properties of Regular Languages.

UNIT III INTERMEDIATE CODE GENERATION **9**

Syntax Directed Definitions, Evaluation orders for syntax directed definitions, Syntax Directed Translation schemes – Variants of syntax trees – Three address codes – Types and Declarations – Translation of expression – Type checking – Control flow – Back patching – Switch statements – Intermediate code for procedures.

UNIT IV OBJECT CODE GENERATION **9**

Storage organization – Stack allocation space – Access to non–local data on the stack – Heap management – Issues in code generation – Target language – Addresses in target code – Design of code generator – Register allocation and assignment – Instruction selection by tree rewriting – Optimal code generation for expressions – Dynamic programming code generation.

UNIT V CODE OPTIMIZATION **9**

Basic blocks and Flow graphs – Optimization of basic blocks – Principal sources of optimization – Data flow analysis – Constant propagation – Partial redundancy elimination – Peephole optimization.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Construct automata, regular expression for any pattern.
- Write Context free grammar for any construct.
- Apply different parsing algorithms to develop the parsers for a given grammar.
- Understand syntax-directed translation and run-time environment.
- Learn to implement code optimization techniques and a simple code generator.

TEXT BOOKS

1. J.E. Hopcroft, R. Motwani and J.D Ullman, "Introduction to Automata Theory, Languages andComputations", 2nd Edition, Pearson Education, 2013.
2. V. Raghavan, "Principles of Compiler Design", Tata McGraw–Hill Education Publishers,2010.

REFERENCES

1. Allen I. Holub, "Compiler Design in C", Prentice–Hall software series, 2012.
2. Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence–based Approach", Morgan Kaufmann Publishers, 2015.

E – RESOURCES

1. https://nptel.ac.in/courses/106/108/106108052/ (Compiler Design)
2. https://onlinecourses.nptel.ac.in/noc20_cs13/preview (Introduction to Compilers)

19CCE501 PHYSICAL AND SYSTEM SECURITY L T P C

3 0 2 4

OBJECTIVES

- To learn the fundamental concept of Physical security.
- To understand the perimeter security measures.
- To study the various access control for security measures.
- To know the security areas and different barriers.
- To know the various security devices.

UNIT I EMERGENCE AND LEVELS OF PHYSICAL SECURITY 9

Emergence and development of physical security - Security for survival and safety - Levels of Physical Security: Minimum-Security, Low-Level Security, Medium Security, High Level Security and Maximum Security.

UNIT II PERIMETER SECURITY MEASURES 9

Moats, Walls, Fences, Watch Towers- Lighting, Alarms, Windows, Grills-Upgrading Roofs, Floors, Doors, Locks - Key Control, Response Force, - Communications and Patrolling

UNIT III ACCESS CONTROL 9

Personnel and Vehicle Entry / Exit Points-ID Badges, Smart Cards, Visitor Pass, - Baggage Check, Searching, Frisking and Escorting.

UNIT IV SECURITY AREAS AND SECURITY BARRIERS 9

Designing Security Area- Demarcating Restricted and Control area - Limited and Exclusion Areas - Security Barriers: Natural, Structural, Human, Animal and Energy Barriers.

UNIT V SECURITY DEVICE 9

Use of Biometrics-DFMD, HHMD – Mirrors – CCTV, Alarms, Breath Analyzer and other security equipment.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Learn the fundamental concept of Physical security.
- Understand the perimeter security measures.
- Produce the access control for security measures.
- Analysis the security areas and different barriers.
- Know the various security devices.

TEXTBOOKS

1. L. J. Fennelly, "Effective Physical Security", Butterworth-Heineman publications, 2017.
2. Truett A. Ricks, Bobby E. Ricks, Jeffrey Dingle, "Physical Security and Safety: A field guide topractitioner", CRC Press, 2015.

REFERENCES

1. M. Khairallah, "Physical security systems handbook: The design and implementation of Electronicsecurity systems", Butterworth-Heinemann publications, 2015.
2. John White, "Security Risk Assessment: Managing Physical and Operational Security", Elsevierscience publications, 2015.

E-REFERENCE

1. https://onlinecourses.nptel.ac.in/noc23_cs62/preview(Foundation of cyber physical system)
2. https://nptel.ac.in/courses/106106199 (Secure system engineering)

19CSE602 INTERNET PROGRAMMING L T P C
3 0 2 4

OBJECTIVES

- To understand different Internet Technologies.
- To learn java-specific web services architecture.
- To expose to java specific web services architecture.
- To understand the validation of a backend process.
- To learn client and server Architectures.
- To apply the concepts of Internet Programming in various applications.

UNIT I WEBSITE BASICS and WEB 2.0 9

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet Protocols - World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Webservers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements– Drag and Drop – Audio – Video controls – CSS3.

UNIT II CLIENT-SIDE PROGRAMMING 9

Java Script: An introduction to JavaScript – JavaScript DOM Model – Date and Objects – Regular Expressions – Exception Handling – Validation – Built-in objects – Event Handling – DHTML with JavaScript – JSON introduction – Syntax – SQL.

UNIT III SERVER-SIDE PROGRAMMING 9

Servlets: Java Servlet Architecture – Servlet Life Cycle – Form GET and POST actions – Session Handling – Understanding Cookies – DATABASE CONNECTIVITY: JDBC perspectives JSP: Understanding Java Server Pages – JSP Standard Tag Library (JSTL) – Creating HTML forms by embedding JSP code.

UNIT IV PHP and XML 9

An introduction to PHP: PHP – Using PHP – Variables – Program control – Built-in functions – Form Validation – Regular Expressions – File handling – Cookies – Connecting to Database. XML:Basic XML – Document Type Definition – XML Schema DOM and Presenting XML, XML Parsers and Validation.

UNIT V AJAX and WEB SERVICES 9

AJAX: Ajax Client Server Architecture – XML Http Request Object – Call Back Methods; Web Services: Introduction – Java web services Basics – (WSDL) – Database Driven web service from an application - SOAP.

LIST OF EXPERIMENTS

(Any Eight Experiments to be Conducted)

1. Create a web page with the following using HTML
   a. To embed a map in a web page,
   b. To fix the hot spots in that map,
   c. Show all the related information when the hot spots are clicked.
2. Create a web page with the following.
   a. Cascading style sheets.
   b. Embedded style sheets.
   c. Inline style sheets.

   Use our college information for the web pages.
3. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
4. Write programs in Java using Servlets: To invoke servlets from HTML forms
5. Session tracking using hidden form fields and Session tracking for a hit count
6. Write programs in Java to create three-tier applications using servlets for conducting online examination for displaying student mark list. Assume that student information is available ina database which has been stored in a database server.
7. Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number)would be stored in web.xml. Each user should have a separate Shopping Cart.
8. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document.
   i. Validate the form using PHP regular expression.
   ii. PHP stores a form data into database.

9. Write a web service for finding what people think by asking 500 People opinion for any consumer product.
10. Socket Programming using any protocol (SMTP, FTP, HTTP, POP3)

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Construct a basic website using HTML and Cascading Style Sheets.
- Build dynamic web page with validation using Java Script objects and by applying different eventhandling mechanisms.
- Develop server programs using Servlets and JSP.
- Construct simple web pages in PHP and to represent data in XML format.
- Use AJAX and web services to develop interactive web applications.
- Learnt to apply the concepts to design web applications.

TEXT BOOKS

1. Deitel and Deitel and Nieto, "Internet and World Wide Web, How to Program", Prentice Hall, 5thEdition, 2011.
2. Gopalan N.P. and J. Akilandeswari, "Web Technology", Prentice Hall of India, 2014.

REFERENCES

1. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2015.
2. Uttam K. Roy, " Web Technologies", Oxford University Press, 2012.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105084/ (Client and Server-side programming)
2. https://nptel.ac.in/courses/106/105/106105166/ (PHP and Ajax)

19CSE501 COMPUTER NETWORKS L T P C

3 0 2 4

OBJECTIVES

- To understand the protocol layering and physical level communication.
- To analyze the various data link protocols and media access.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the protocols and congestion control of the Transport layer.
- To understand the functions of the application layer protocols.
- To apply the various algorithms to enhance the networking.

UNIT I INTRODUCTION AND PHYSICAL LAYER 9

Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switching – 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 – Introduction to Wireless LANs – IEEE802.11, Bluetooth – Connecting Devices.

UNIT III NETWORK LAYER 9

Network Layer Services – Packet switched networks – 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– Congestion Control and Techniques.

UNIT V APPLICATION LAYER 9

WWW and HTTP – FTP – Email –Telnet – SSH – DNS – SNMP.

TOTAL : 45 PERIODS

LIST OF EXPERIMENTS

(Any Eight Experiments to be Conducted)

1. Learn to use commands like tcp dump, netstat, ipconfig, lookup and traceroute. Capture Ping andtraceroute PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like:
    a. Echo client and echo server
    b. Chat
    c. File Transfer
4. Use a tool like Wireshark to capture packets and examine the packets.
5. Simulation of an error correction code (like CRC)
6. Write a code simulating ARP /RARP protocols.
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms usingNS.
8. Simulation of Distance Vector/ Link State Routing algorithm.
9. Implementation of Checksum and congestion control algorithms.
10. Development of a packet capture and filtering application using raw sockets.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Understand the basic layers and its functions in computer networks.
- Know the various data link protocols and media access.
- Analyze and design routing algorithms.
- Study the transport protocols and congestion control in transport layer.
- Understand the working of various application layer protocols.
- Apply the concepts and algorithms in networking applications

TEXT BOOKS

1. Behrouz A Forouzan, "Data Communication and Networking", 4th Edition, McGraw Hill, 2016.
2. William Stallings, "Data and Computer Communications", 10th Edition, Pearson Education, 2013.

REFERENCES

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, 5th Edition, Morgan Kaufmann Publishers Inc., 2012.
2. Nader F. Mir, Computer and Communication Networks, 2nd Edition, Prentice Hall, 2014.

E – RESOURCES

1. https://nptel.ac.in/courses/106/106/106106091/ (Introduction to Computer Networks)
2. https://nptel.ac.in/courses/106/105/106105082/ (Computer Networks)

19EEC501 **QUANTITATIVE APTITUDE LEARNING** **L T P C**

(Common to Civil, CSE ,ECE ,EEE & Mechanical) **0 2 0 0**

OBJECTIVES

- To introduce the basics concepts and techniques of numbers, Highest common factor and Least common multiple.
- To develop the use of decimal fraction and problems on ages.
- To introduced basic concepts of time, work, distance, calendar and clock.
- To acquaint the student with the concept of simple and compound interest.
- To produce the knowledge of polynomial and quadratic equations.

UNIT I NUMBERS, HIGHEST COMMON FACTOR AND LEAST COMMON MULTIPLE 9

Numbers and their basic classification – Types of number – Basic operations of numbers – Progression – Tests of divisibility – Highest common factor – Least common multiple.

UNIT II DECIMAL FRACTION AND PROBLEMS BASED ON AGES 9

Decimal fraction – Types of fraction – Comparison of fractions – Inserting fractions in between two given fractions – Relation between decimal fraction and normal fraction – Conversion of a decimal fraction into a vulgar fraction – Types of decimals – Conversion of mixed recurring decimal into a vulgar fraction – Standard form of decimal – Problems based on ages.

UNIT III TIME, WORK, DISTANCE, CALENDER AND CLOCK 9

General rule for time and work – General rule for work and wages – Speed – Unit of speed – Average speed – Some useful relations – Problems on Trains – Calenders and clocks – Odd days – Ordinary year – Leap year.

UNIT IV SIMPLE INTEREST, COMPOUND INTEREST AND ELEMENTARY ALGEBRA 9

Simple interest – Compound interest – Some useful relations – Difference between compound interest and simple interest – Short cut methods to solve special types of problems – Elementary Algebra and averages.

UNIT V POLYNOMIAL AND QUADRATIC EQUATIONS 9

Polynomial introduction – Degree of a polynomial – Types of polynomial – Operations on polynomial – Remainder and factor theorem – Quadratic equation – Pure Quadratic equation –Discriminant – Roots of the Quadratic equations – Solution of Quadratic equation – Framing of a Quadratic equation – Special types of roots.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Use the basic concepts and techniques of the numbers, Highest common factor and Least common multiple.
- Apply the concept of decimal fraction and problems on ages.
- Apply the concept of time, work, distance, calender and clock.
- Acquire skills in simple interest, compound interest and elementary algebra.
- Be exposed to concepts and properties of polynomial and quadratic equations.

TEXT BOOKS

1. Aggarwal R.S., "Quantitative Aptitude", S.Chand & Company Ltd, New Delhi, 2012.
2. Dinesh Khattar, "Quantitative Aptitude for competitive examinations", Pearson India Education Services Pvt. Ltd, New Delhi, 2019.

REFERENCES

1. Praveen R.V., "Quantitative Aptitude and Reasoning", PHI Learning Private Limited, Delhi, 2013.
2. Gupta P, "A unique Approach to Quantitative Aptitude ", Unique Publishers (I) Pvt. Ltd, New Delhi, 2017.

E – RESOURCES

1. https://youtube.com/playlist?list=RDQM5Xl256aOq24 (Time and Work)
2. https://youtu.be/KE7tQf9spPg (Aptitude)

19MDC501	VALUE ADDED COURSE – II (WEB TECHNOLOGIES)	LT P C - - - -

(.NET/JAVASCRIPT/FIREBASE FRAMEWORK/ NODE JS WITH EXPRESS/ PHP)

Students shall undergo any one of the above said course

OBJECTIVES

- To learn the basic concepts in HTML, CSS, JavaScript.
- To understand the responsive design and development.
- To implement the trendy frameworks and establishment.
- To learn the web project management and maintenance process.
- To design a website with HTML5, JS, CSS3.
- To understand the real time hosting.

COURSE CONTENTS

1. Basic concepts of Web Technology and Internet Fundamentals.
2. Creation of CSS, Scripting and Interactive web pages.
3. Discussions on Server side and Client side programming, Web and application servers, Hypertext Preprocessor (PHP) and content management systems.
4. Learn the basics to advance level with different projects using frameworks.
5. Insight into Internet security, e–commerce, databases, social networking, mobiledeviceWeb design, and cloud computing.
6. Learn different frameworks with frontend and backend activities.
7. Understand the database connectivity.
8. Establish the real time hosting.
9. Learn to build a responsive website.

OUTCOMES

Upon completion of the course, the students will be able to,

- Design Website using HTML5, CSS3 and JS.
- Design Responsive Sites.
- Manage, Maintain and Support Web Apps.
- Design Simple Applications using the web technologies.
- Maintain Database Connectivity.

TEXT BOOKS

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, 2014Edition.
2. Uttam K. Roy, "Web Technologies" Oxford University Press, 13th impression, 2017.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105084/ (Introduction to Internets)
2. https://nptel.ac.in/courses/106/106/106106156/ (Modern Application Development)

TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU

SEMESTER VI

19CCT601 BLOCKCHAIN TECHNOLOGY L T P C

3 0 0 3

OBJECTIVES

- To study the basics and various real time applications of blockchain.
- To learn decentralization and cryptography for block chain application.
- To know the use of block chain technology for bit coin, alternative coins and develop smart contracts.
- To know a distributed application using Ethereum.
- To expose an application using Hyperledger.

UNIT I BLOCK CHAIN 9

Distributed systems - The history of block chain - Introduction to block chain – definitions elements - Features - Applications of block chain technology - Tiers - Types of block chain - Consensus in blockchain - CAP theorem - Benefits and limitations of block chain.

UNIT II DECENTRALIZATION AND CRYPTOGRAPHY TECHNICAL FOUNDATION 9

Decentralization using block chain – Methods – Routes - Block chain and full ecosystem decentralization - Smart contract - Decentralized applications – Platforms for decentralization. Cryptography and Technical Foundations– Introduction - Cryptography - Confidentiality - Integrity — Authentication -Cryptographic primitives - Asymmetric cryptography - Public and private keys – RSA - Discrete logarithm problem - Hash functions - Elliptic Curve Digital signature algorithm.

UNIT III BITCOINS AND ALTERNATIVE COINS 9

Bit Coin – Transactions – Block chain - Bit coin payments - Alternative Coins – Theoretical foundations -Bit coin limitations – Name coin - Lit coin – Prime coin – Zcash - Smart Contracts.

UNIT IV ETHEREUM 9

Introduction – Ethereum block chain - Elements of the Ethereum block chain - Precompiled contracts – Accounts – Block – Ether – Messages – Mining - Clients and wallets - The Ethereum network – Ethereum Development.

UNIT V HYPERLEDGER 9

Projects – Protocol - Hyperledger Fabric – Saw tooth lake – Corda – Block chains-Outside Of Currencies: Internet of Things – Government – Health – Finance.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Determine the basics and various real time applications of blockchain
- Apply decentralization and cryptography for blockchain application
- Make use of blockchain technology for bitcoin, alternative coins and develop smart contracts
- Develop a distributed application using Ethereum.
- Deploy an application using Hyperledger.

TEXT BOOK

1. Imran Bashir, "Mastering Block chain Distributed ledgers, decentralization and smart contractsExplained", Packt Publishing, 1st Edition, 2017.
2. Arshdeep Bahga, Vijay Madisetti, "Blockchain Applications: A Hands On Approach",VPT Publisher, 2017.

REFERENCES

1. Roger Wattenhofer, "The Science of the Block chain" Create Space Independent Publishing, 2016.
2. Brenn Hill, Samanyu Chopra, Paul Vallencourt, "Block chain Quick Reference: A guide to exploring decentralized blockchain application development", Packt publishing, 1st Edition 2016

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview (Block chain and its application)
2. https://onlinecourses.nptel.ac.in/noc20_cs01/preview (Introduction to block chain technology andinformation)

19CCT602 NETWORK SECURITY L T P C

3 1 0 4

OBJECTIVES

- To understand the basic concepts of security
- To understand the concept of authentication protocols and digital signatures.
- To learn various methods and protocols to understand the cryptography.
- To learn various network security attacks.
- To understand the IP and Web security.

UNIT I FUNDAMENTALS OF NETWORKING SECURITY 9

Overview of networking security- Security Services -Confidentiality, Authentication, Integrity, Non-repudiation, access Control - Availability and Mechanisms- Security Attacks -Interruption, Interception , Modification and Fabrication.

UNIT II AUTHENTICATION AND SECURITY 9

Authentication overview - Authentication protocols - Authentication and key establishment - key exchange - mediated key exchange - User Authentication –password-based authentication - password security - Certificate Authority and key management - digital signatures - digital Certificates.

UNIT III PUBLIC-KEY CRYPTOGRAPHY AND MESSAGE AUTHENTICATION 9

Basics of cryptography -cryptographic hash functions - symmetric and public-key encryption - public key cryptography principles & algorithms - cipher block modes of operation - Secure Hash Functions — HMAC

UNIT IV SECURITY ATTACKS 9

Buffer overflow attacks & format string vulnerabilities - Denial-of-Service Attacks -Hijacking attacks: exploits and defenses - Internet worms — viruses — spyware –phishing — botnets - TCP session hijacking - ARP attacks - route table modification - UDP hijacking - man-in-the-middle attacks.

UNIT V IP SECURITY AND WEB SECURITY 9

Network defense tools: Firewalls, VPNs, Intrusion Detection, and filters - Email privacy: Pretty Good Privacy (PGP) and S/MIME - Network security protocols in practice- Introduction to Wireshark — SSL -IPsec, and IKE -DNS security- Secure Socket Layer (SSL) and Transport Layer Security (TLS) - Secure Electronic Transaction (SET)

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students should be able to:

- Explain the basic concepts of security
- Apply the concept of authentication protocols and digital signatures.
- Analyze the various methods and protocols to understand the cryptography.
- Define the various network security attacks.
- Explain the IP and Web security.

TEXT BOOKS

1. William Stallings, "Network Security Essentials: Applications and Standards", Pearson Education, 4th Edition, 2011.
2. William Stallings, "Cryptography and network Security", PHI/Pearson, 3rd edition, 2012.

REFERENCES

1. Ryan Russell & Dan Kaminsky, "Hack Proofing your network", Elsevier Science , 2nd Edition,2012.
2. S. Bellovin, "A look back at Security Problems in the TCP/IP Protocol Suite", ACSAC ,2014.

E RESOURCES

1. https://nptel.ac.in/courses/106105031 (Cryptography and network security)
2. https://onlinecourses.nptel.ac.in/noc21_cs16/preview (The areas of cryptography and cryptanalysis)

19CCE601 **SECURE CODING** **L T P C**

3 0 2 4

OBJECTIVES

- To learn the need for secure coding and the importance of proactive development process
- To understand the common security flaws in string manipulation and its resulting vulnerabilities
- To know the vulnerabilities in dynamic memory management: critically analyze the input issues
- To study the concept of database and xss
- To know the web fundamental principles of software security engineering.
- To apply the concept of XSS in web application.

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UNIT I INTRODUCTION TO SECURE CODING **9**

Security-CIA Triad- Viruses, Trojans, and Worms In a Nutshell, Security Concepts- exploit, threat, vulnerability, risk, attack- Malware Terminology: Rootkits, Trapdoors, Botnets, Key loggers, Honeypots- Active and Passive Security Attacks. IP Spoofing, Tear drop, Dos, DDoS,XSS, SQL injection, Smurf, Man in middle, Format String attack.

UNIT II SECURE CODING TECHNIQUES **9**

Secure Coding Techniques: Protection against DoS attacks, Application Failure Attacks, CPU Starvation Attacks, Insecure Coding Practices In Java Technology. ARP Spoofing and its countermeasures. Buffer Overrun- Stack overrun, Heap Overrun, Array Indexing Errors, Format String Bugs.

UNIT III SECURE CODING IN C **9**

Character strings - String manipulation errors - String Vulnerabilities and exploits - Mitigation strategies for strings - Pointers - Mitigation strategies in pointer-based vulnerabilities - Buffer Overflow based vulnerabilities

UNIT IV SECURE CODING IN C++ AND JAVA **9**

Dynamic Memory Management - Common errors in dynamic memory management - Memory managers - Double -free vulnerabilities - Integer security - Mitigation strategies.

UNIT V DATABASE AND WEB-SPECIFIC ISSUES **9**

Database and Web-specific issues: SQL Injection Techniques and Remedies, Race conditions, Time of Check Versus Time of Use and its protection mechanisms. Validating Input and Interprocess Communication, Securing Signal Handlers and File Operations. XSS scripting attack and its types — Persistent and Non persistent attack XSS Countermeasures and Bypassing the XSS Filters.

OUTCOMES

Upon completion of the course, Students will be able to:

- Illustrate the need for secure coding and the importance of proactive development process.
- Examine the common security flaws in string manipulation and its resulting vulnerabilities.
- Identify the vulnerabilities in dynamic memory management.
- Critically analyze the input issues related to database and xss.
- Summarize the web fundamental principles of software security engineering.
- Learnt to apply the concepts to design web applications.

List of Experiments

(Any Eight Experiments to be Conducted)

1. Create a simple web application that takes user input and performs some action (e.g., saving data to a database).
2. Implement input validation to ensure that the user input is properly sanitized and validated to prevent common vulnerabilities like SQL injection or cross-site scripting (XSS) attacks.
3. Test the application by providing malicious input to see if the validation effectively detects and prevents such attacks.
4. Develop a web page that is vulnerable to XSS attacks.
5. Demonstrate how an attacker can inject malicious JavaScript code into the page and manipulate user data. Then, implement measures to prevent XSS attacks, such as input sanitization, output encoding, and Content Security Policy (CSP) headers.
6. Build a login system for a web application. Implement secure password storage using hashing and salting techniques. Test the system by attempting to bypass the authentication mechanism using techniques like brute-forcing, session hijacking, or session fixation.
7. Create a program that allows users to upload and download files. Implement file upload validation to prevent common vulnerabilities like file inclusion attacks or file overwrites. Use secure file permissions and enforce file type restrictions.
8. Develop a RESTful API that interacts with a database or performs some sensitive operations. Implement authentication and authorization mechanisms to ensure only authorized users can access the API endpoints.

9. Develop an application that handles errors and exceptions. Implement appropriate error handling mechanisms to avoid leaking sensitive information in error messages.
10. Build a program that encrypts sensitive user input or output data. Implement strong encryption algorithms and best practices for key management.

TOTAL : 45+15=60 PERIODS

TEXT BOOK

1. Michael Howard and David LeBlanc, "Writing Secure Code", 2 nd Edition, Microsoft Press,2015.
2. Robert C. Seacord, "Secure Coding in C and C++", 2 nd Edition, Pearson Education,2013.

REFERENCES

1. Julia H. Allen, Sean J. Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, "Software Security Engineering: A Guide for Project Managers", Addison-Wesley Professional.2015.
2. Mark G. Graff, Kenneth R. van, "Secure Coding: Principles and Practices", O'Reilly Media,Inc,2013

E RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_cs91/preview (Introduction to secure computation)
2. https://www.digimat.in/nptel/courses/video/106108229/L35.html (Advantage of Secure computation)

19CCE602 **BIG DATA AND CLOUD COMPUTING** **L T P C**

3 0 2 4

OBJECTIVES

- To study the overview of cloud computing.
- To know the services provided by Cloud.
- To know the events maintaining inside the Cloud.
- To familiarize the concept of service oriented architecture.
- To learn the some of the tools available for the creating Cloud.
- To practice the various tools for creating a cloud environment.

UNIT I INTRODUCTION TO BIG DATA **9**

Classification of digital data – Characteristics of data – Challenges – Five Vs- Typical Hadoop environment- Classification of analytics- Data science – Terminologies used in big data environments- Parallel Vs Distributed Environment-Big data applications

UNIT II INTRODUCTION TO HADOOP ECO SYSTEM **9**

Introduction to Hadoop Eco system- Hadoop core components- Hadoop distributions- HDFS- Common Hadoop Shell commands- Processing data with Hadoop- Name Node- Secondary Name Node, and Data Node - Hadoop Map Reduce paradigm- Map and Reduce tasks, Job, Task trackers - Cluster Setup SSH & Hadoop Configuration - HDFS Administering - Monitoring & Maintenance.

UNIT III CLOUD FUNDAMENTALS **9**

Defining cloud computing – cloud types – characteristics – assessing the role of open standards measuring the cloud's value – computing total cost of ownership – specifying service level agreements– defining licensing models – understanding cloud architecture – cloud computing stack – connecting to the cloud.

UNIT IV CLOUD SERVICES **9**

Defining IaaS – PaaS – SaaS – IdaaS – CaaS – Platforms – using virtualization techniques– load balancing and virtualization – understanding hypervisors – machine imaging – porting applications – capacity planning – exploring platform as a service.

UNIT V CLOUD INFRASTRUCTURE AND MOBILE CLOUD **9**

Managing the cloud – administering – cloud management products – emerging cloud management standards – understanding cloud security – securing the cloud – securing data – establishing identity and presence – working with mobile devices – mobile web services.

List of Experiments

(Any Eight Experiments to be Conducted)

1. Working with Pig (write Pig Latin scripts to sort, group, join, project, and filter your data)
2. Working with Hive (use Hive to create, alter, and drop databases, tables, views, functions, and indexes)
3. Big Data Stream processing
   a) Working with data warehouse (create database, distribute data and analyse data in a data warehouse)
   b) Data Visualization using Big Sheet/Power BI/Tableau
4. Installation and Configuration of Hadoop.
5. Hadoop Implementation of file management tasks, such as Adding files and directories, Retrieving files and Deleting files.
6. Implementation of Para-Virtualization using VM Ware's Workstation/ Oracle's Virtual Box and Guest O.S.
7. Installation of Google App Engine Launcher.
8. Create an application to run on compiler in virtualized OS.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Describe the concepts and technologies of big data analytics.
- Apply the techniques in storing, handling and analyzing big data.
- Discuss the concepts and terminologies of cloud computing.
- Demonstrate cloud frameworks and technologies.
- Describe and apply fine data intensive computing.
- Apply and analyze the various tools for creating a cloud environment.

TEXT BOOKS

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley, 2011.
2. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, "Mastering Cloud Computing" McGraw Hill Education, 2015.

REFERENCES

1. Anthony T.Velte, Toby J.Velte Robert Elsenpeter, "Cloud Computing: A Practical Approach", TataMcGraw – Hill Education Private Limited, New Delhi 2010.
2. Timothy Chou, "Introduction to Cloud Computing", Kindle Edition, 2010.

E – RESOURCES

1. https://onlinecourses.nptel.ac.in/noc20_cs20/preview (Cloud Computing)
2. https://nptel.ac.in/courses/106/105/106105223/ (Introduction to Cloud)

19CSJ601	MINI PROJECT	L T P C 0 0 2 1

OBJECTIVES

- Identify a specific problem for the current need of the society and collecting information related to the same through detailed review of articles.
- Develop the skills to formulate a technical project.
- Utilize new tools, algorithms and mechanisms that contribute to obtain the solution.
- Test and validate the results obtained through conformance.
- Prepare project reports and to face reviews and viva-voce examination.

GUIDELINES

The students in a group of 3 to 4 works on a topic approved by the Head of the Department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by the Project Coordinator and internal examiner constituted by the Head of the Department.

TOTAL: 30 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Identify a specific problem for the current need of the society and collecting information related to the same through detailed review of articles.
- Develop the skills to formulate a technical project.
- Test and validate the results obtained through conformance.
- Prepare project reports and to face reviews and viva voce examination.
- Take up any challenging practical problems and find the solution by formulatingproper methodology.

19MDC601	CONSTITUTION OF INDIA (Common to all branches)	L T P C 3 0 0 0

OBJECTIVES

- To understand the Meaning of the constitution law and constitutionalism.
- To realize the fundamental rights.
- To understand the execution powers of union and states.
- To be aware of the Constitutional powers.
- To acquaint with other Constitutional Functionaries.

UNIT I INTRODUCTION

Meaning of the constitution law and constitutionalism – Historical perspective of the Constitution of India – Preamble – Salient features and characteristics of the Constitution of India - Citizenship.

UNIT II FUNDAMENTAL RIGHTS

Scheme of the fundamental rights – The scheme of the Fundamental Duties and its legal status The Directive Principles of State Policy – Its importance and implementation.

UNIT III UNION AND STATE EXECUTIVE

Federal structure and distribution of legislative and financial powers between the Union and the States – Parliamentary Form of Government in India – The constitution powers and status of the President of India — Governor — Appointment, Powers and Functions.

UNIT IV CONSTITUTIONAL POWERS

Amendment of the Constitutional Powers and Procedure – The historical perspectives ofthe constitutional amendments in India – Emergency Provisions : National Emergency, President Rule, Financial Emergency.

UNIT V OTHER CONSTITUIONAL FUNCTIONARIES

Election Commission of India: Organization, Powers and Functions, Union Public Service Commission, State Public Service Commission – Local Self Government.

OUTCOMES

Upon completion of the course, Students will be able to:

- Understand the Salient features and characteristics of the Constitution of India.
- Analyze the scheme of the Fundamental rights and Duties.
- Evaluate in detail the powers between the Union and the States.
- Know the concept of Constitutional Powers.
- Recognize other constitutional functionaries.

TEXT BOOKS

1. Durga Das Basu, "Introduction to the Constitution of India**"**,24th Edition,Lexis Nexis Publishers,2019**.**
2. Subhash by C. Kashyap**, "**Our Constitution", National Book Trust,2019.

REFERENCES

1. M.Laxmikanth, "Indian Polity", 5th Edition, Spectrum Publishers,2016.
2. Granville Austin, "The Indian Constitution: Cornerstone of a Nation",Classic Reissue, Oxford India Publishers, 1999.

E – RESOURCES

1. https://www.youtube.com/watch?v=vq2Q1_v6TNU (Constitution)
2. https://www.india.gov.in/my–government/constitution–india/constitution–india–full text (Fundamental Rights)

SEMESTER VII

19CCT701 CYBER SECURITY LAWS L T P C

3 0 0 3

OBJECTIVES

- To acquaint the knowledge of cybercrime and cyber law.
- To explore the cyber attacks and tools for mitigating them.
- To enhance the knowledge of various cybercrime tools and methods.
- To introduce the concept of computer forensics.
- To learn how to prevent a cyber attack

UNIT I INTRODUCTION 9

Cyber Security – History of Internet – Impact of Internet – CIA Triad; Reason for Cyber Crime – Need for Cyber Security – History of Cyber Crime; Cybercriminals – Classification of Cybercrimes – A Global Perspective on Cyber Crimes; Cyber Laws – The Indian IT Act – Cybercrime and Punishment.

UNIT II CYBERCRIME 9

Mobile and Wireless Devices: Introduction - Proliferation of Mobile, and Wireless Devices - Trends in Mobility - Credit Card Frauds in Mobile and Wireless - Computing Era - Security Challenges posed by Mobile Devices - Registry Settings for Mobile Devices - Authentication Service Security - Attacks on Mobile/Cell Phones - Mobile Devices: Security Implications for organizations - Organizational Measures for Handling Mobile.

UNIT III TOOLS AND METHODS USED IN CYBERCRIME 9

Introduction - Proxy Servers and Anonymizers - Phishing - Password Cracking - Keyloggers and Spywares - Virus and Worms - Trojan Horses and Backdoors — Steganography - DoS and DDoS Attacks - Buffer Overflow - Attacks on Wireless Networks - Phishing and Identity Theft: Introduction – Phishing - Identity Theft (ID Theft)

UNIT IV UNDERSTANDING COMPUTER FORENSICS 9

Understanding the Requirements - Computer Forensics and Steganography - Relevance of the OSI 7 -Layer Model to Computer Forensics - Forensics and Social Networking Sites: The Security/Privacy Threats – Computer Forensics from Compliance Perspective - Challenges in Computer Forensics - Special Tools and Techniques - Forensics – Auditing

UNIT V INTRUSION PREVENTION 9

Introduction to Security Policies and Cyber Laws: Need for an Information-Security Policy- Information Security Standards - ISO - Introducing Various Security - Policies and their Review —— Process - Introduction to Indian Cyber Law.

TOTAL:45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explain the basics of cyber security, cybercrime and cyber law
- Classify various types of attacks and learn the tools to launch the attacks
- Apply various tools to perform information gathering
- Apply intrusion techniques to detect intrusion
- Apply intrusion prevention techniques to prevent intrusion

TEXTBOOKS

1. Anand Shinde, "Introduction to Cyber Security Guide to the World of Cyber Security", Notion Press, 2021
2. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publishers, 2013

REFERENCES

1. David Kim, Michael G. Solomon, "Fundamentals of Information Systems Security", Jones & Bartlett Learning Publishers, 2013.
2. Kimberly Graves, "CEH Official Certified Ethical Hacker Review Guide", Wiley Publishers, 2007.
3. William Stallings, Lawrie Brown, "Computer Security Principles and Practice", Third Edition, Pearson Education, 2015.

E RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs127/preview (cyber security and privacy)
2. https://www.google.com/search?q=nptel+videos &ei=TuKoZJitJODaseMPjJWQ6AI&ved (Computer Forensics)

19CCE701	WEB SECURITY	L T P C
		3 0 2 4

OBJECTIVES

- To understand the fundamentals of web application security.
- To focus on wide aspects of secure development and deployment of web applications.
- To learn how to build secure APIs.
- To learn the basics of vulnerability assessment and penetration testing.
- To get an insight about Hacking techniques and Tools.
- To apply and analyze the various algorithm for Hacking techniques.

UNIT I FUNDAMENTALS OF WEB APPLICATION SECURITY 9

The history of Software Security-Recognizing Web Application Security Threats-Web Application Security-Authentication and Authorization - Secure Socket layer - Transport layer Security- Session Management-Input Validation

UNIT II SECURE DEVELOPMENT AND DEPLOYMENT 9

Web Applications Security - Security Testing, Security Incident Response Planning, The Microsoft Security Development Lifecycle (SDL) - OWASP Comprehensive Lightweight Application Security Process (CLASP) - The Software Assurance Maturity Model (SAMM)

UNIT III SECURE API DEVELOPMENT 9

API Security- Session Cookies - Token Based Authentication - Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys, OAuth2- Securing Microservice APIs: Service Mesh, Locking Down Network Connections - Securing Incoming Requests.

UNIT IV VULNERABILITY ASSESSMENT AND PENETRATION TESTING 9

Vulnerability Assessment Lifecycle- Vulnerability Assessment Tools: Cloud-based vulnerability scanners- Host-based vulnerability scanners- Network-based vulnerability scanners, Database based vulnerability scanners- Types of Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing- Mobile Application Testing.

UNIT V HACKING TECHNIQUES AND TOOLS 9

Social Engineering, Injection - Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery- Security Misconfiguration - Insecure Cryptographic Storage - Failure to Restrict URL Access, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc.

LIST OF EXPERIMENTS

(Any Eight Experiments to be Conducted)

1. Install Wireshark and explore the various protocols
   a) Analyze the difference between HTTP vs HTTPS
   b) Analyze the various security mechanisms embedded with different protocols.
2. Identify the vulnerabilities using OWASP ZAP tool
3. Create simple REST API using python for following operation
   a) GET
   b) PUSH
   c) POST
   d) DELETE
4. Install Burp Suite to do following vulnerabilities:
   a) SQL injection
   b) Cross-site scripting (XSS)
5. Attack the website using Social Engineering method
6. Apply DES algorithm for practical applications.
7. Apply AES algorithm for practical applications.
8. Implement RSA Algorithm using HTML and JavaScript
9. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
10. Calculate the message digest of a text using the SHA-1 algorithm.

TOTAL: 45 +15=60 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Understanding the basic concepts of web application security and the need for it.
- Be acquainted with the process for secure development and deployment of web applications.
- Acquire the skill to design and develop Secure Web Applications that use Secure APIs.
- Be able to get the importance of carrying out vulnerability assessment and penetration testing.
- Acquire the skill to think like a hacker and to use hackers tool sets.
- Apply and analyze the various algorithm for Hacking techniques.

TEXT BOOKS

1. Andrew Hoffman, "Web Application Security: Exploitation and Countermeasures for Modern Web Applications", O'Reilly Media, Inc, Ist Edition, 2020,
2. Bryan Sullivan, Vincent Liu, " Web Application Security: A Beginners Guide", McGraw-Hill Companies, 2012.

REFERENCES

1. Michael Cross, "Developer's Guide to Web Application Security", Syngress Publishing, Inc, 2017,
2. Ravi Das and Greg Johnson, "Testing and Securing Web Applications" Taylor & Francis Group, LLC, 2021.

E RESOURCES

1. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview (Introduction to cyber security)
2. https://nptel.ac.in/courses/128106006 (Web security)

19CSJ701 **PROJECT WORK(PHASE – I)** **L T P C**

0 0 2 1

OBJECTIVES

- To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of articles.
- To develop the skills to formulate a technical project.
- To analyze the problem statement with respect to the solutions.
- To design a methodology to resolve the identified problem.

GUIDELINES

The students in a group of 3 to 4 works on a topic approved by the Head of the Department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constitutedby the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 30 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Identify a specific problem for the current need of the society and collecting information related tothe same through detailed review of articles.
- Develop the skills to formulate a technical project.
- Analyze the problem statement with respect to the solutions.
- Design the methodology to resolve the identified problem.

SEMESTER VIII

19CSJ801	**PROJECT WORK (PHASE – II)**	**L T P C** **0 0 20 10**

OBJECTIVES

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To utilize new tools, algorithms and mechanisms that contribute to obtain the solution.
- To test and validate the results obtained through conformance.
- To prepare project report and to face reviews and viva voce examination.
- To develop the ability to take up the challenging practical problems.

GUIDELINES

The students in a group of 3 to 4 works on a topic approved by the Head of the Department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Develop the ability to solve a specific problem till the successful solution of the same.
- Utilize new tools, algorithms and mechanisms that contribute to obtain the solution.
- Test and validate the results obtained through conformance.
- Prepare project report and to face reviews and viva voce examination.
- Take up any challenging practical problems and find the solution by formulating proper methodology.

LIST OF PROFESSIONAL ELECTIVES

SEMESTER VI

19CSPX01	**DATA WAREHOUSING AND MINING**	**L T P C** **3 0 0 3**

OBJECTIVES

- To learn the basics of data mining, data preprocessing and data visualization techniques.
- To understand data warehouse concepts, architecture and business analysis tools.
- To study algorithm for finding hidden patterns and associations in data.
- To know the various classification methods.
- To understand the different clustering and outlier detection methods.

UNIT I INTRODUCTION **9**

Introduction to Data Mining Systems – Knowledge Discovery Process – Technologies – Applications Major issues in Data Mining – Data Objects and Attribute Types – Basic Statistical Descriptions of Data –Data Visualization – Measuring Data Similarity and Dissimilarity – Data Preprocessing.

UNIT II DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING **9**

Data warehouse: Basic Concepts – Data Cube and OLAP – Data Warehouse Design and Usage –Data Warehouse Implementation – Data Generalization by Attribute – Oriented Induction.

UNIT III FREQUENT PATTERN ANALYSIS **9**

Mining Frequent patterns, Associations and Correlations: Basic Concepts – Frequent Item set Mining Methods – Pattern Evaluation Methods – Pattern Mining in Multilevel, Multidimensional Spaces – Constraint-Based Frequent Pattern Mining.

UNIT IV CLASSIFICATION **9**

Basic Concepts — Decision Tree Induction — Bayes Classification Methods — Rule-Based Classification –Bayesian Belief Networks – Support Vector Machines – Other Classification Methods.

UNIT V CLUSTER ANALYSIS AND OUTLIER DETECTION **9**

Cluster Analysis – Partitioning Methods – Hierarchical Methods – Density-based Methods – Grid- Based Methods – Clustering in High Dimensional Data – Outliers and Outlier Analysis – Outlier Detection Methods.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Acquire the knowledge of data mining, data preprocessing and visualization.
- Model and design data warehouse architecture and perform analysis with tools.
- Apply Frequent pattern and association rules mining techniques for data analysis.
- Understand Proper Classification techniques for data analysis.
- Apply suitable Clustering methods for data analysis.

TEXT BOOKS

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", 3rd Edition, Elsevier,2012.
2. Alex Berson and Stephen Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – HillEdition, 13th Reprint, 2018.

REFERENCES

1. Pang Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education,2014.
2. Daniel T. Larose, "Data Mining Methods and Models", Wiley – Inder science, 2016.

E – RESOURCES

1. https://nptel.ac.in/courses/110/107/110107092 (Data Mining)
2. https://nptel.ac.in/courses/106/106/106106046 (Classification)

19CCPX01 **MOBILE COMPUTING** **L T P C**

3 0 0 3

OBJECTIVES

- To understand the basic concepts of mobile computing.
- To learn the basics of mobile telecommunication system.
- To be familiar with the network layer protocols and Ad–Hoc networks.
- To know the basis of transport and application layer protocols.
- To learn the various applications of Mobile OS.

UNIT I INTRODUCTION **9**

Introduction to Mobile Computing – Mobile Computing Applications – Generations of Mobile Communication Technologies – Characteristics of Mobile computing – Structure of Mobile Computing Application – MAC Protocols – SDMA – TDMA – FDMA – CDMA.

UNIT II MOBILE TELECOMMUNICATION SYSTEM **9**

Introduction to Cellular Systems – GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS – UMTS – Architecture – Handover – Security.

UNIT III MOBILE NETWORK LAYER **9**

Mobile IP – Key Mechanism in Mobile IP – DHCP – Ad Hoc – Proactive protocol – DSDV, Reactive Routing Protocols – DSR, AODV, Hybrid routing – ZRP, Multicast Routing – ODMRP, Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT IV MOBILE TRANSPORT AND APPLICATION LAYER **9**

Mobile TCP – WAP – Architecture – WDP – WTLS – WTP – WSP – WAE – WTA Architecture –WML.

UNIT V MOBILE PLATFORMS AND APPLICATIONS **9**

Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explain the basics of mobile telecommunication systems.
- Illustrate the generations of telecommunication systems in wireless networks.
- Determine the functionality of MAC, network layer and identify a routing protocol for a given Ad hoc network.
- Summarize the functionality of Transport and Application layers.
- Explain the need for mobile operating systems.

TEXT BOOKS

1. Jochen Schiller, "Mobile Communications", Pearson India, 2019.
2. Prasant Kumar Patnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt.Ltd,New Delhi ,2012.

REFERENCES

1. Asoke K Talukdar, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing: Technology, Applicationsand Service Creation", 2nd Edition, Tata McGraw Hill, 2012.
2. Theodore Rappaport," Wireless Communications – Principles and Practice", 2nd Edition, PearsonEducation India, 2010.

E – RESOURCES

1. https://nptel.ac.in/courses/106/106/106106147/ (Introduction to Mobile Computing)
2. https://nptel.ac.in/courses/117/102/117102062/ (Wireless Communication)

19CCPX02 VULNERABILITY ANALYSIS AND PENETRATION TESTING L T P C

3 0 0 3

OBJECTIVES

- To understand vulnerability and its implications.
- To formulate the techniques of information gathering
- To discover the system hacking methods and its advancement
- To perform a wireless pen testing
- To learn about wireless traffic analysis

UNIT I INTRODUCTION 9

Penetration Testing phases/Testing Process, types and Techniques, Blue/Red Teaming, Strategies of Testing, Non-Disclosure Agreement Checklist, Phases of hacking, Open-source/proprietary Pentest Methodologies.

UNIT II INFORMATION GATHERING AND SCANNING 9

Information gathering methodologies- Foot printing, Competitive Intelligence DNS Enumerations- Social Engineering attacks, Port Scanning-Network Scanning Vulnerability Scanning- NMAP scanning tool- OS Fingerprinting- Enumeration.

UNIT III SYSTEM HACKING 9

Password cracking techniques- Key loggers- Escalating privileges- Hiding Files, Double Encoding, Steganography technologies and its Countermeasures. Active and passive sniffing- ARP Poisoning, MAC Flooding- SQL Injection — Error based, Union-based, Time-based, Blind SQL, Out-of-band. Injection Prevention Techniques.

UNIT IV ADVANCED SYSTEM HACKING 9

Broken Authentication, Sensitive Data Exposure, XML External Entities, Broken Access Code, XSS - Stored, Reflected, DOM Based.

UNIT V WIRELESS PENTEST 9

Wi-Fi Authentication Modes, Bypassing WLAN Authentication, Types of Wireless Encryption, WLAN Encryption Flaws, AP Attack, Attacks on the WLAN Infrastructure, DoS-Layer1, Layer2, Layer 3, DDoS Attack, Client Mis association, Wireless Hacking Methodology, Wireless Traffic Analysis.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Apply the concept of vulnerability and its implications.
- Explain the techniques of information gathering
- Analyze the system hacking methods and its advancement
- Examine the wireless pen testing
- Summarize about the wireless traffic analysis

TEXT BOOKS

1. Kali Linux, Vivek Ramachandran, CameronBuchanan, " Wireless Penetration Testing Beginner's Guide" Packt Publishing, 2015.
2. Justin Clarke-Salt, "SQL Injection Attacks and Defense", Syngress Publication,1st Edition, 2012.

REFERENCE

1. Prakhar Prasad , "Mastering Modern Web Penetration Testing", Packt Publishing, 2016
2. Wolf Halton, Bo Weaver, "Kali Linux 2: Windows Penetration Testing", Packt Publishing,2016.

E RESOURCES

1. https://www.digimat.in/nptel/courses/video/106106178/L12.html (Introduction to penetration testing)
2. https://nptel.ac.in/courses/105101008 (Fundamental parameter of traffic flow)

19CCPX03 **ETHICAL HACKING** **L T P C**
3 0 0 3

OBJECTIVES

- To study about the importance of information security.
- To learn different scanning and enumeration methodologies and tools.
- To understand various hacking techniques and attacks.
- To be exposed to programming languages for security professionals.
- To explore the different phases in penetration testing.

UNIT I INTRODUCTION TO HACKING **9**

Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Foot printing – Information Gathering Methodology – Foot printing Tools – WHOIS Tools – DNS Information Tools - Locating the Network Range – Meta Search Engines.

UNIT II SCANNING AND ENUMERATION **9**

Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.

UNIT III SYSTEM HACKING **9**

Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Countermeasures – Escalating Privileges – Executing Applications Keyloggers and Spyware

UNIT IV PROGRAMMING FOR SECURITY PROFESSIONALS **9**

Programming Fundamentals – C language – HTML – Perl – Windows OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures

UNIT V PENETRATION TESTING **9**

Introduction – Security Assessments – Types of Penetration Testing- Phases of Penetration Testing– Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to

- Identify the various threats to computers
- Explain how to defend hacking attacks
- Analyze about how to Protect data assets.
- Defend a computer against a variety of security attacks using various tools.
- Practice and use safe techniques on the World Wide Web.

TEXT BOOKS

1. EC-Council, "Ethical Hacking and Countermeasures: Attack Phases", Cengage Learning, 2010.
2. Jon Erickson, "Hacking, 2nd Edition: The Art of Exploitation", No Starch Press Inc., 2018.

REFERENCES

1. Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking and NetworkDefense", Cengage Learning, 2013.
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing – Ethical Hackingand Penetration Testing Made Easy", Second Edition, Elsevier, 2013.

E RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs13/preview (Ethical hacking)
2. https://archive.nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs68/ (System hacking)

19CCPX04 MOBILE AND WIRELESS SECURITY L T P C

3 0 0 3

OBJECTIVES

- To study about the mobile subjective tools
- To gain the knowledge of mobile security using applications
- To learn about the security in cellular networks
- To explore about the security level in MANET
- To learn the installation and maintaining in Data center

UNIT I SECURITY ISSUES IN MOBILE COMMUNICATION 9

Mobile Communication History, Security – Wired Vs Wireless, Security Issues in Wireless and Mobile Communications, Security Requirements in Wireless and Mobile Communications, Security for Mobile Applications, Advantages and Disadvantages of Application – level Security.

UNIT II SECURITY OF DEVICE, NETWORK AND SERVER LEVELS 9

Mobile Devices Security Requirements- Mobile Wireless network level Security- Server Level Security. Application Level Security in Wireless Networks: Application of WLANs, Wireless Threats, Vulnerabilities and Attach Methods over WLANs, Security for 1G Wi-Fi Applications, Security for 2G Wi-Fi Applications,

UNIT III APPLICATION LEVEL SECURITY IN CELLULAR NETWORKS 9

Generations of Cellular Networks- Security Issues and attacks in cellular networks-GSM Security for applications-GPRS Security for applications- UMTS security for applications- 3G security for applications, Some of Security and authentication Solutions.

UNIT IV APPLICATION LEVEL SECURITY IN MANETS 9

Manets: Some applications of MANETs- MANET Features- Security Challenges in MANETs- Security Attacks on MANETs- External Threats for MANET applications- Internal threats for MANET Applications, Some of the Security Solutions.

UNIT V DATA CENTER OPERATIONS 9

Data Center Operations - Security challenge- implement "Five Principal Characteristics of Cloud Computing- Data center Security Recommendations Encryption for Confidentiality and Integrity- Encrypting data at rest- Key Management Lifecycle - Cloud Encryption Standards.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Identify the mobile subjective tools
- Explain how to Protect mobile security using applications
- Analyze the security in cellular networks
- Illustrate Hacking attacks in security level using MANET
- Design the installation and maintaining in Data center

TEXT BOOKS

1. Pallapa Venkataram, Satish Babu, "Wireless and Mobile Network Security", 1st Edition, Tata McGrawHill,2010.
2. Frank Adelstein, K.S. Gupta, "Mobile and Pervasive Computing", 1st Edition, Tata McGraw Hill 2015.

REFERENCES

1. Randall k. Nichols, Panos C. Lekkas, "Wireless Security Models, Threats and Solutions", 1st Edition,Tata McGraw Hill, 2016.
2. Bruce Potter and Bob Fleck, "802.11 Security", 1st Edition, SPD O'REILLY, 2015.

E RESOURCES

1. https://www.digimat.in/nptel/courses/video/106106167/L01.html (Security of devices)
2. http://www.digimat.in/nptel/courses/video/106105082/L31.html (Security of cellular devices)

19CST601 MACHINE LEARNING TECHNIQUES L T P C 3 0 0 3

OBJECTIVES

- To Introduce the basic concepts and techniques of machine learning.
- To study the various neural network algorithms.
- To learn the concept of genetic algorithms for machine learning techniques.
- To learn the learning set of rules.
- To observe the graphical models of machine learning algorithms.

UNIT I INTRODUCTION 9

Introduction – Designing a Learning System – Perspectives and issues in Machine Learning – A Concept Learning Task – Version Spaces and the Candid Elimination Algorithm – Inductive bias Decision Tree learning – Inductive bias in Decision Tree Learning – Issues in Decision Tree Learning.

UNIT II NEURAL NETWORKS 9

Neural Network Representations – perceptron – Multilayer and Backpropagation Algorithm – An Illustrative Examples: Face Recognition – Advanced Topics in Artificial Neural Networks.

UNIT III GENETIC ALGORITHMS 9

Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning – Parallelizing Genetic Algorithms.

UNIT IV LEARNING SET OF RULES 9

Introduction – Sequential Covering Algorithms – Learning First-Order Rules – learning Sets of First-Order Rules: FOIL – Induction as Inverted Deduction – Inverting Resolution.

UNIT V GRAPHICAL MODELS 9

Introduction – Geberative Models – d-Separation – Belief Propagation – Learning the Structure of Graphical Models – Hidden Markov Model.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Build the software architecture and its quality attributes.
- Discuss and apply back propagation algorithm for machine learning applications.
- Analyze the genetic algorithms for various problems.
- Explain set of rules for machine learning.
- Design systems that use appropriate graph models of machine learning.

TEXT BOOKS

1. Tom M. Mitchell, "Machine Learning", McGraw–Hill Education (India) Private Limited, 2013.
2. Ethem Alpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and MachineLearning Series)", 3rd Edition, MIT Press, 2014.

REFERENCES

1. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", CRC Press, 2012.
2. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals",1st Edition, Wiley, 2014.

E–RESOURCES

1. https://nptel.ac.in/courses/106/105/106105152/ (Different Types of Learning)
2. https://nptel.ac.in/courses/106/106/106106202/ (Learning Problem)

19CCPX05 **WSN SECURITY** **L T P C**
3 0 0 3

OBJECTIVES

- To study about the concepts of sensor network.
- To learn the functionalities of MAC in WSN
- To understand the various functionalities of routing algorithms.
- To provide appropriate solutions for network management and Middleware services.
- To learn about the various applications of WSN

UNIT I WSN ARCHITECTURES **9**

Single-node architecture - Hardware components- Energy consumption of sensor nodes- Operating systems and execution environments- Sensor network scenarios- Optimization goals- Design principles for WSNs- Service interfaces of WSNs- Gateway concepts.

UNIT II MEDIUM ACCESS CONTROL PROTOCOLS **9**

Wireless channel and communication fundamentals- Physical layer and transceiver design considerations in WSNs- Fundamentals of wireless MAC protocols- Low duty cycle protocols and wakeup concepts- Contention-based protocols- Schedule-based protocols- Random Access-Based Protocols.

UNIT III ROUTING AND DATA GATHERING PROTOCOLS FOR WSN **9**

Routing Challenges and Design Issues in Wireless Sensor Networks- Routing Strategies in Wireless Sensor Networks- Data-centric networking- Data-centric routing- Data aggregation- Data-centric storage.

UNIT IV NETWORK MANAGEMENT FOR WSN **9**

WSN Middleware Principle, Middleware Architecture-Existing Middleware-Network Management Requirements, Traditional Network Management Models- Network Management Design Issues, Operating System Design Issues -WSN Design Issues- Performance Modeling of WSN, Case Study: Simple Computation of the System Life Span

UNIT V APPLICATIONS OF WSN **9**

Home Control - Building Automation - Industrial Automation - Medical Applications - Reconfigurable Sensor Networks - Highway Monitoring - Military Applications - Civil and Environmental Engineering Applications - Wildfire Instrumentation - Habitat Monitoring - Nanoscopic Sensor Applications — CaseStudy: Target detection and tracking - Contour/edge detection - Field sampling

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explain the concepts of sensor network using WSN architecture
- Identify appropriate physical and MAC layer protocols for WSN
- Compare thefunctionalities of routing algorithms in Sensornetworks.
- Use appropriate solutions for network management and Middleware services in WAN.
- Demonstrate various applications in wireless sensor networks

TEXT BOOKS

1. C. Siva Ram Murthy and B.S. Manoj, "Ad Hoc Wireless Networks – Architectures andProtocolsǁ", Pearson Education, 2016.
2. Holger Karl, Andreas Willing, "Protocols and Architectures for Wireless Sensor Networksǁ", JohnWiley & Sons, Inc., 2015.

REFERENCES

1. Subir Kumar Sarkar, T G Basavaraj, C Puttamadappa, "Ad Hoc Mobile Wireless Networksǁ" ,AuerbachPublications,2018.
2. Carlos De Morias Cordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and Applications", World Scientific Publishing, 2nd Edition, , 2013.

E RESOURCES

1. https://www.digimat.in/nptel/courses/video/106105160/L01.html(Wireless Sensor networks part I)
2. https://www.digimat.in/nptel/courses/video/106105160/L02.html(Wireless Sensor networks part II)

19CCPX18 RESOURCE MANAGEMENT TECHNIQUES L T P C

3 0 0 3

OBJECTIVES

- To study the fundamentals of linear programming.
- To familiarize with resource management techniques.
- To solve problems in linear programming and Integer programming
- To know the classical optimization theory.
- To be Exposed to Critical Path Method and Programme evaluation review technique.

UNIT I LINEAR PROGRAMMING 9

Principal components of decision problem – Modeling phases – LP Formulation and graphic Solution –Resource allocation problems – Simplex method.

UNIT II DUALITY AND NETWORKS 9

Definition of dual problem – Primal – Dual relationships – Dual simplex methods – Post Optimality analysis – Transportation and assignment model – Shortest route problem.

UNIT III INTEGER PROGRAMMING 9

Cutting plan algorithm – Branch and bound methods, Multistage (Dynamic) programming.

UNIT IV CLASSICAL OPTIMISATION THEORY 9

Unconstrained external problems, Newton – Raphson method – Equality constraints – Jacobean methods – Lagrangian method – Kuhn-Tucker conditions – Simple problems.

UNIT V OBJECT SCHEDULING 9

Network diagram representation – Critical path method – Time charts and resource leveling – Data Science Applications: E-Commerce – Website Recommendation – Health care – Fraud and Risk Detection.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Solve optimization problems using graphic solution.
- Develop optimization problems using simplex methods.
- Apply integer programming and linear programming to solve real-life applications
- Use Jacobean methods solve Simple problems.
- Compare PERT and CPM for problems in project management.

TEXT BOOKS

1. H.A. Taha, "Operation Research", Prentice Hall of India, 2012.
2. Paneer Selvam, "Operations Research", Prentice Hall of India, 2012.

REFERENCES

1. Vohra, "Quantitative Techniques in Management", Tata Mc Graw Hill, 2015.
2. Winston, "Operation Research", Thomson Learning, 2013.

E – RESOURCES

1. https://nptel.ac.in/courses/111/102/111102012/ (Linear Programming Problems)
2. https://freevideolectures.com/course/4737/nptel–project–management/21(Project Management)

19CCPX06 **DATA PRIVACY** **L T P C**
3 0 0 3

OBJECTIVES

- To study the introduction on data security threats and its techniques.
- To learn about session management and configuration management.
- To understand the concept of Authentication and Authorization.
- To explore about the session management.
- To provide the knowledge about the cryptography Techniques.

UNIT I DATA SECURITY THREATS, DATA SECURITY THREAT TECHNIQUES 9

Introduction, Data breach, Identity Theft, Bank fraud Physical or Digital theft (Stolen laptops, removable media, impersonation)-Malware, SQL Injection, Dumpster diving, Phishing and Pre-Phishing-Denial of Service attack- Social Engineering.

UNIT II COUNTER MEASURES AND DATABASE ACTIVITY MONITORING TOOL 9

Introduction- Disk Encryption- Hardware based mechanisms for protecting data, Backups, Data masking, Data Erasure- Database Activity Monitoring using IBM Infosphere Guardium.

UNIT III APPLICATION SECURITY, AUTHENTICATION AND AUTHORIZATION 9

Input Validation - Buffer overflow- cross-site scripting- SQL injection- canonicalization, Sensitive information Access sensitive data in storage- network eavesdropping- data tampering Network eavesdropping- Brute force attack- dictionary attacks- cookie replay- credential theft Elevation of privilege- disclosure of confidential data- data tampering- luring attacks- Phishing.

UNIT IV CONFIGURATION MANAGEMENT AND SESSION MANAGEMENT 9

Unauthorized access to administration interfaces- unauthorized access to configuration stores- retrieval of clear text configuration data- lack of individual accountability- over privileged process and service accounts. Hijacking- session replay- man in the middle.

UNIT V CRYPTOGRAPHY AND ITS PARAMETER 9

Cryptography Poor key generation or key management- weak or custom encryption Parameter manipulation- Query string manipulation- form field manipulation- cookie manipulation- HTTP header manipulation, Exception management Information disclosure- denial of service Auditing and logging, User denies performing an operation; attacker exploits an application without trace- attacker covers his or her tracks, Countermeasures Introduction to code analysis using IBM Rational AppScan

TOTAL: 45 PERIODS.

OUTCOMES

Upon completion of the course, Students will be able to:

- Analyze about Work on data security threats and it's techniques.
- Explain about Work on DB activity monitoring tools.
- Summarize an overview of code analysis.
- Demonstrate hijacking Techniques.
- Implement different cryptography key generation Techniques.

TEXT BOOKS

1. David Salomon ,"Data Privacy and Security", Springer New York, NY,2013
2. B. Thuraisingham, Reind van de Riet ,"Data and Application Security", Springer Publication,2013.

REFERENCE BOOKS

1. Nataraj Venkataramanan , Ashwin Shriram, "Data Privacy: Principles and Practice", Chapman and Hall/CRC ,2016.
2. Nishant Bhajaria, "Data Privacy: A run book for engineers", Manning publications ,Ist Edition, ,2022

E – RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs127/preview (Cyber security and Privacy)
2. https://archive.nptel.ac.in/courses/106/105/106105162/(cryptography and network security)

19CCPX07 CYBER FORENSICS AND INVESTIGATION L T P C
3 0 0 3

OBJECTIVES

- To learn cybercrime and forensics
- To become familiar with forensics tools
- To learn to analyze and validate forensics data
- To understand cyber laws and the admissibility of evidence with case studies
- To learn the vulnerabilities in network infrastructure with ethical hacking

UNIT I INTRODUCTION TO CYBER CRIME AND FORENSICS 9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Role of ECD and ICT in Cybercrime - Classification of Cyber Crime. The Present and future of Cybercrime - Cyber Forensics -Steps in Forensic Investigation - Forensic Examination Process - Types of CF techniques - Forensic duplication and investigation – Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II EVIDENCE COLLECTION AND FORENSICS TOOLS 9

Processing Crime and Incident Scenes — Digital Evidence - Sources of Evidence -Working with File Systems. - Registry - Artifacts - Current Computer Forensics Tools: Software/ Hardware Tools - Forensic Suite - Acquisition and Seizure of Evidence from Computers and Mobile Devices - Chain of Custody-Forensic Tools

UNIT III ANALYSIS AND VALIDATION 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics – Analysis of Digital Evidence - Admissibility of Evidence - Cyber Laws in India - Case Studies

UNIT IV ETHICAL HACKING 9

Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats – Sniffing – Email Tracking. Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications — SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

UNIT V INVESTIGATION **9**

Introduction to Cyber Crime Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking. **TOTAL: 45 PERIODS**

OUTCOMES

Upon completion of the course, Students will be able to:

- Understand the basics of cybercrime and computer forensics
- Apply a number of different computer forensic tools to a given scenario
- Analyze and validate forensics data
- Understand Admissibility of evidence in India with Cyber laws and Case Studies
- Identify the vulnerabilities in a given network infrastructure

TEXT BOOKS

1. Bill Nelson, Amelia Phillips, Christopher Stuart, "Guide to Computer Forensics andInvestigations", Cengage Learning, India Sixth Edition, 2019.
2. Nilakshi jain , R. Kalbande, "Digital Forensic: The Fascinating World of Digital Evidences", Wiley publications, 2016.

REFERENCE BOOKS

1. John R.Vacca, "Computer Forensics ", Cengage Learning, 2005
2. MarjieT.Britz, "ComputerForensics and Cyber Crime: An Introduction", 3rd Edition, Prentice Hall, 2013.
3. Kenneth C.Brancik "Insider Computer Fraudll", Auerbach Publications, 2018.

E RESOURCES

1. https://onlinecourses.swayam2.ac.in/cec21_ge10/preview (cyber forensics)
2. https://onlinecourses.nptel.ac.in/noc23_cs127/preview (computer forensics)

19CCPX08 **MOBILE OS SECURITY** **L T P C**

3 0 0 3

OBJECTIVES

- To study the basic concepts and functions of operating systems.
- To understand the types of OS.
- To learn about Processes and memory management schemes.
- To know about the development strategies of mobile os.
- To gain insight on various security models.

UNIT I FUNDAMENTALS OF OPERATING SYSTEMS **9**

Overview — Synchronization Mechanisms — Processes and Threads - Process Scheduling — Deadlocks: Detection, Prevention and Recovery – Models of Resources – Memory Management Techniques

UNIT II TYPE OF MOBILE OPERATING SYSTEMS **9**

Introduction - Type of Mobile OS - Android OS - Bada OS - BlackBerry OS - iPhone OS / iOS — MeeGoOS - Palm OS - Windows Mobile

UNIT III SECURE APP DEVELOPMENT AND DISTRIBUTION **9**

Principles of secure app development for mobile platforms - Best practices for secure coding - avoiding common vulnerabilities-Understanding app permissions -impact on security and privacy-App signing and digital certificates-App store guidelines and security requirements-Risks associated with side loading apps - alternative app stores.

UNIT IV MOBILE DATA SECURITY **9**

Securing mobile communication protocols-secure data transmission and encryption-Mobile network attacks-Securing sensitive data on mobile devices-Data encryption techniques and secure storage-Mobile device management (MDM) and remote wipe capabilities

UNIT V SECURITY MODELS **9**

Basic security and cryptographic techniques - Mobile Malware and App Security - Android Security Model IOS Security Model - Security Model of the Windows Phone - Emerging Trends in Mobile Security - Case study of Android as Mobile OS

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Compare and contrast various memory management schemes.
- Analyze the different types of mobile os.
- Discuss the various synchronization, and memory management issues.
- Identify the issues and development strategies
- Discuss the various Security models.

TEXT BOOKS

1. Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems — Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2014
2. Abraham Silber Schatz; Peter Baer Galvin; Greg Gagne, "Operating System Concepts", Seventh Edition, John Wiley & Sons, 2017.

REFERENCES

1. Daniel P Bovet and Marco Cesati, "Understanding the Linux kernel", 3rd edition, O'Reilly, 2019.
2. Himanshu Dwivedi, Chris Clark, David Thiel, "Mobile Application Security" , Tata McGraw Hill, 1stEdition, 2016.

E RESOURCES

1. https://archive.nptel.ac.in/courses/106/105/106105172/(Fundamentals of operating system)
2. https://www.digimat.in/nptel/courses/video/106106144/(operating system security)

19CCPX09 INTRUSION DETECTION AND PREVENTION L T P C

3 0 0 3

OBJECTIVES

- To study the vulnerabilities and detection techniques of various attacks
- To learn the network intrusion detection and prevention mechanisms
- To understand the countermeasures of various information security attacks
- To explore the typical intrusion detection system
- To employ specific feature extraction techniques

UNIT I INTRUSION DETECTION SYSTEMS PRINCIPLES 9

History of Intrusion detection, Audit, Concept and definition, Internal and external threats to data, attacks, Key functions of IDPS technologies - Common Detection Methodologies-Signature &amp- Anomaly based Detection- Stateful protocol analysis Types of IDS, Information sources Host based information sources- Network based information sources.

UNIT II IDS TECHNOLOGIES 9

Components &amp- Architecture-Typical components, Network Architectures Security capabilities - Information gathering capabilities- logging capabilities- detection &amp- prevention capabilities. Intrusion Prevention Systems, Network protocol based IDS- Hybrid IDS- Analysis schemes- thinking about intrusion. A model for intrusion analysis- techniques Responses requirement of responses- types of responses mapping responses to policy Vulnerability analysis-.

UNIT III NETWORK BASED IDS 9

Networking Overview-OSI layers. Components and Architecture - Typical components, Network architectures and sensor locations- Security capabilities Wireless IDPS-Wireless Networking overview-WLAN standards &amp- components. Components Network Behavior analysis system.

UNIT IV HOST BASED IDS 9

Components and Architecture-Typical Components-Network architectures, Agent locations, host architectures. Security capabilities-Logging, detection, prevention and other capabilities-Using & Integrating multiple IDPS technologies-Need for multiple IDPS technologies, Integrating different IDPS technologies-Direct &amp- Indirect IDPS integration.

UNIT V IDS TOOL: SNORT IDS **9**

Introduction to Snort- Working with Snort Rules- Snort configuration- Snort with MySQL- Running Snort on Multiple Network Interfaces- Snort Modes Snort Alert Modes- Snarf with Snort- Agent development for intrusion detection- Architecture models of IDS and IPS.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Design and implement Intrusion Detection System
- Understand t classes of attacks on computer systems
- Identify various types of IDS of signature based and anomaly-based techniques
- Solve problems related to intrusion detection and prevention.
- Develop specific feature extraction techniques

TEXT BOOKS

1. Karen Scarfone, Peter Mell & quot , "Guide to Intrusion Detection and Prevention Systems (IDPS)", NIST special publication, 2012.
2. Kerry J Cox, Christopher Gerg, " Managing Security with Snort and IDS Tools" , O′Reilly,2017.

REFERENCES

1. Carl Endorf, Eugene Schultz and Jim Mellander, "Intrusion Detection & Preventionǁ" ,1stEdition, Tata McGraw-Hill, 2016
2. Christopher Kruegel, Fredrik Valeur, Giovanni Vigna:, "Intrusion Detection and CorrelationChallenges and Solutionsǁ", 1st Edition, Springer, 2015.

E RESOURCES

1. https://www.digimat.in/nptel/courses/video/106105031/L01.html(network based IDS)
2. https://www.digimat.in/nptel/courses/video/106106178/L48.html(IDS Evidence Acquistion and SNORT

19CCPX10 BIOMETRICS AND SECURITY L T P C

3 0 0 3

OBJECTIVES

- To understand the fundamentals of biometric security
- To acquire knowledge on standard algorithms and protocols used to provide confidentiality, integrity and authenticity.
- To know the various key distribution and management strategies.
- To inculcate how to deploy encryption techniques to secure data using biometric.
- To practice security applications in the field of Information technology

UNIT I ATTACKS IN BIOMETRIC 9

Adversary attacks-attacks at the user Interface-Attacks on the biometric processing, Attacks on template database –system security analysis – spoofing and mimicry attacks

UNIT II BIOMETRIC AUTHENTICATION PROTOCOLS 9

Introduction-biometric based secure cryptographic protocols – biometrics based cryptographic key Regeneration and sharing – Biometrics based session key generation and sharing protocol – performance evaluation strategies.

UNIT III BIOMETRIC CRYPTOGRAPHY 9

Protection of biometric data –biometric data shuffling scheme- experimental results –security analysis - cryptographic key Reservation - cryptographic key with biometrics-Revocability in key generation system-Adaptations of Generalized key Regeneration scheme –IRIS Biometrics –Face Biometrics – Extension of Key Regeneration scheme.

UNIT IV BIOMETRIC DATA PROTECTION 9

Biometric data – Concept of personal data – Data protection and privacy – Security criteria for Biometric system – Adoption of security – Revocation procedures – Security and organizational aspects of biometric system.

UNIT V BIOMETRIC MULTI MODAL AND APPLICATIONS 9

Integration – Multiple traits – Multiple snapshots – Score fusion methods – Applications – Board Security Identification cards – Biometrics on smart cards – Overview of local and global structure – Mechanismfor on card comparison – Off card and On card alignment – Smart textile sensors – Bio signals – Biometrics and intelligence services.

TOTAL: 45 PERIODS

OUTCOMES

Upon Completion of the course, Students will be able to:

- Implement basic security algorithms required by the biometric system.
- Analyze the vulnerabilities in biometric system and hence be able to design a security solution.
- Analyze the possible security attacks in complex real time systems and their effective
- Identify the security issues in the network and resolve it.
- Formulate research problems in the biometric security field

TEXT BOOKS

1. David Check Ling NGO, Andrew Beng Jin Teoh, Jiankun Hu, " Biometric Security" &, CambridgeScholars,2015
2. Els. J. Kindt, "Privacy and data protection issues of Biometric Applications", Springer,2013.

REFERENCES

1. Eliza Yinzi Du, "Biometrics from fiction to practice ǁ", Panstandford Publishers 2012.
2. James wayman, "Introduction to Biometricsǁ", Springer, 2011.

E RESOURCES

1. https://www.digimat.in/nptel/courses/video/106104119/L01.html (Biometric cryptography)
2. https://nptel.ac.in/courses/106104119/L02.html (Biometric Data protection)

19CCPX11 INFORMATION SECURITY AND RISK MANAGEMENT L T P C

3 0 0 3

OBJECTIVES

- To understand the basics of Information Security.
- To know the legal, ethical and professional issues in Information Security.
- To learn the aspects of risk management.
- To aware of various standards in this area.
- To enhance the knowledge of technological aspects of Information Security.

UNIT I INTRODUCTION 9

Introduction to Information Security- concepts and terminology - Need for security — Importance ofinformation security in today's digital life – understanding the goals of information security: confidentiality, integrity and availability

UNIT II SECURITY POLICIES AND PROCEDURES 9

Development and implementation -security policies and procedures-Role of security standards and best practices-Regulatory compliance - legal considerations

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk — Systems: Disaster Recovery and Business Continuity Planning: Preparation and Implementation - Operation and Maintenance- Enterprise Risk Management- Operational Risk Management - Financial Risk Management

UNIT IV RISK ANALYSIS AND EVALUATION 9

Risk tolerance and appetite – Risk analysis techniques – Risk prioritization and ranking – cost in risk management – Risk mitigation techniques – Risk avoidance and elimination – Risk transfer and insurance Risk acceptance and contingency planning

UNIT V CRISIS MANAGEMENT 9

Role and elements of a plan - International standards in IR/DR/BC – Case scenarios for IR/DR/BC

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explain the basics of information security.
- Illustrate the legal, ethical and professional issues in information security.
- Demonstrate the aspects of risk management.
- Develop a disaster recovery and business continuity plans for sustained organizational operations
- Identify Integrate IR, DR and BC plans into a coherent strategy for crisis management

TEXT BOOKS

1. Whitman, M. E., Mattord, H. J., and Green, A., "Principles of Information Security", 6th Edition,Cengage Learning, 2018.
2. Whitman, M. E., Mattord, H. J., and Green, A., "Principles of incident response and disasterrecovery", 2 nd Edition, Cengage Learning, 2014.

REFERENCES

1. Whitman, M. E., Mattord, H. J., and Green, A., "Hands-on-Information Security Lab Manual", 4thEdition, Cengage Learning, 2014.
2. Michel crouhy, Dan Galai, Robert Mark, "Essential of Risk Management" McGraw HillProfessional,2015.

E RESOURCES

1. https://www.digimat.in/nptel/courses/video/106106129/L01.html(Securityinvestigation)
2. https://www.digimat.in/nptel/courses/video/103107156/L02.html (Risk management)

19CCPX13 **CLOUD SECURITY** **L T P C**
3 0 0 3

OBJECTIVES

- To Introduce Cloud Computing terminology, definition and concepts
- To learn the security design and architectural considerations for Cloud
- To know the Identity, Access control in Cloud
- To provide best practices for Cloud security using various design patterns
- To be able to monitor and audit cloud applications for security

UNIT I FUNDAMENTALS OF CLOUD SECURITY CONCEPTS 9

Overview of cloud security- Security Services - Confidentiality, Integrity, Authentication, Nonrepudiation, Access Control - Basic of cryptography - Conventional and public-key cryptography, hash functions, authentication, and digital signatures.

UNIT II SECURITY DESIGN AND ARCHITECTURE FOR CLOUD 9

Security design principles for Cloud Computing - Comprehensive data protection - End-to-end access control - Common attack vectors and threats - Network and Storage - Secure Isolation Strategies - Virtualization strategies - Inter-tenant network segmentation strategies – Data Protection strategies: Data retention, deletion and archiving procedures for tenant data, Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key

UNIT III ACCESS CONTROL AND IDENTITY MANAGEMENT 9

Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot – Intruder Detection and prevention

UNIT IV CLOUD SECURITY DESIGN PATTERNS 9

Introduction to Design Patterns, Cloud bursting, Geo-tagging, Secure Cloud Interfaces, Cloud Resource Access Control, Secure On-Premise Internet Access, Secure External Cloud

UNIT V MONITORING, AUDITING AND MANAGEMENT 9

Proactive activity monitoring - Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges - Events and alerts - Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management, U ser management, Identity management, Security Information and Event Management

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Understand the cloud concepts and fundamentals.
- Explain the security challenges in the cloud.
- Define cloud policy and Identity and Access Management.
- Understand various risks and audit and monitoring mechanisms in the cloud.
- Define the various architectural and design considerations for security in the cloud.

TEXTBOOKS

1. Raj Kumar Buyya , James Broberg, andrzej Goscinski, "Cloud Computing:", Wiley 2013.
2. Dave Shackleford, "Virtualization Security", SYBEX a wiley Brand 2013.
3. Mather, Kumaraswamy and Latif, "Cloud Security and Privacy", OREILLY 2011.

REFERENCES

1. Mark C. Chu-Carroll, "Code in the Cloudll", CRC Press, 2011.
2. RajkumarBuyya, ChristianVechhiola, S. ThamaraiSelvi, "Mastering Cloud Computing Foundations and Applications Programming", Elsevier publications, 2015.

E RESOURCES

1. https://archive.nptel.ac.in/courses/106/105/106105167/ (Introduction to Cloud security)
2. https://www.digimat.in/nptel/courses/video/106105167/L01.html (Security Design)

19CSPX17 **INTERNET OF THINGS** **L T P C**
3 0 0 3

OBJECTIVES

- To understand Smart Objects and IoT Architectures.
- To learn about various IoT – related protocols.
- To produce simple IoT Systems using Arduino and Raspberry Pi.
- To acquaint the knowledge of data analytics and cloud in the context of IoT.
- To use the IoT infrastructure for popular applications.

UNIT I FUNDAMENTALS OF IoT **9**

Evolution of Internet of Things – Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack – Fog,Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II IoT PROTOCOLS **9**

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT.

UNIT III DESIGN AND DEVELOPMENT **9**

Design Methodology – Embedded computing logic – Microcontroller, System on Chips – IoT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfaces and RaspberryPi with Python Programming.

UNIT IV DATA ANALYTICS AND SUPPORTING SERVICES **9**

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IoT, Python Web Application Framework – Django

AWS for IoT –System Management with NETCONF – YANG.

UNIT V CASE STUDIES/INDUSTRIAL APPLICATIONS 9

Cisco IoT system – IBM Watson IoT platform – Manufacturing – Converged Plant wide Ethernet Model(CPwE) – Power Utility Industry – Grid Blocks Reference Model – Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explain the concept of IoT.
- Analyze various protocols for IoT.
- Design a PoC of an IoT system using Raspberry PI/Arduino.
- Apply data analytics and use cloud offerings related to IoT.
- Analyze applications of IoT in real time scenario.

TEXT BOOKS

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.
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands–on approach", Universities press, 2015.

REFERENCES

3. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012 .
4. 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.

E–RESOURCES

1. https://nptel.ac.in/courses/106/105/106105166/ (Introduction to IoT)
2. https://nptel.ac.in/courses/108/108/108108098/ (IoT Protocols)

OPEN ELECTIVE

19CCOX01	HUMAN COMPUTER INTERACTION	L T P C 3 0 0 3

OBJECTIVES

- To study the foundations of Human Computer Interaction.
- To be familiar with the design technologies for individuals and persons with disabilities.
- To know the aware of mobile HCI.
- To Learn the guidelines for user interface.
- To practice the interactive designs.

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.

UNIT II DESIGN & AMP; 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

Cognitive models – Socio-Organizational issues and stake holder 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.

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: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Design effective dialog for HCI.
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback
- Explain the HCI implications for designing multimedia/ecommerce/e-learning Web sites.
- Develop meaningful user interface.

TEXT BOOKS

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3 rd Edition, Pearson Education, 2014 (UNIT I, II & III).
2. Brian Fling, "Mobile Design and Development", 1 st Edition, O'Reilly Media Inc., 2019.

REFERENCES

1. Bill Scott and Theresa Neil, "Designing Web Interfaces", 1 st Edition, O'Reilly, 2019.
2. Yvonne Rogers, Preece, Jenny, Rogers, Yvonne, "Interaction Design – Beyond Human Computer Interaction",3 rd Edition, Wiley,2011.

E – RESOURCES

1. https://nptel.ac.in/courses/106/103/106103115 (Human Computer Interaction – HCI)
2. https://nptel.ac.in/courses/106/106/106106177/ (Introduction to HCI)

19CCOX02 ENTERPRISE RESOURCE PLANNING L T P C

3 0 0 3

OBJECTIVES

- To study the basics of ERP.
- To learn the key implementation issues of ERP.
- To know the business modules of ERP.
- To be aware of some popular products in the area of ERP.
- To provide knowledge about the current and future trends in ERP.

UNIT I INTRODUCTION 9

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM.

UNIT II ERP IMPLEMENTATION 9

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring.

UNIT III THE BUSINESS MODULES 9

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

UNIT IV THE ERP MARKET 9

ERP Market Place, SAP AG, Peoplesoft, Baan, JD Edwards, Oracle, QAD, SSA.

UNIT V ERP – PRESENT AND FUTURE 9

Turbo Charge the ERP System, EIA, ERP and e–Commerce, ERP and Internet, Future Directions.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explain the basics of ERP.
- Elaborate the key implementation issues of ERP.
- Create the business modules of ERP.
- Analyze about popular products of ERP.
- Illustrate about the current and future trends in ERP.

TEXT BOOKS

1. Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2010.
2. Mary Sumner, "Enterprise Resource Planning", Pearson Education, 2017.

REFERENCES

1. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2011.
2. Vinod Kumar Garg and Venkatakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2013.

E–RESOURCES

1. http://akwl.org/wp–content/uploads/2016/01/ERP–Notes.pdf (Enterprise Resource Planning)
2. https://www.coursera.org/lecture/enterprise–systems/1–1b–introduction–to–enterprise–resource–planning–ERP–Lenson (Introduction to Enterprise Resource Planning)

19CCOX03 **SECURITY IN INDUSTRY 4.0** **LT P C**

3 0 0 3

OBJECTIVES

- To study the basics for Industry 4.0
- To learn about iot and iot for Industry 4.0
- To enhance the knowledge of various technologies of Industry 4.0
- To know the data role in Industry 4.0
- To understand the Strategies of Industry 4.0

UNIT I INTRODUCTION TO INDUSTRY 4.0 **9**

The Various Industrial Revolutions - Digitalization and the Networked Economy - Drivers, Enablers, Compelling Forces and Challenges for Industry 4.0 - Comparison of Industry 4.0 Factory and Today's Factory - Trends of Industrial Big Data and Predictive Analytics for Smart Business Transformation

UNIT II ROAD TO INDUSTRY 4.0 **9**

Internet of Things (IoT) & Industrial Internet of Things (IIoT) & Internet of Services - Smart Manufacturing - Smart Devices and Products - Smart Logistics - Smart Cities - Predictive Analytics

UNIT III SYSTEM, TECHNOLOGIES FOR ENABLING INDUSTRY 4.0 **9**

Cyber Physical Systems - Robotic Automation and Collaborative Robots - Support System for Industry 4.0 - Mobile Computing - Cyber Security

UNIT IV ROLE OF DATA, INFORMATION AND KNOWLEDGE **9**

Role of data, information, knowledge and collaboration in future organizations - Resource- based view of a firm - Data as a new resource for organizations - Harnessing and sharing knowledge in organizations - Cloud Computing Basics -Cloud Computing and Industry 4.0

UNIT V CASE STUDY **9**

Industry 4.0 IIoT case studies - Opportunities and Challenges - Future of Works and Skills for Workers in the Industry 4.0 Era - Strategies for competing in an Industry 4.0 world – Society 5.0

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explain about the CPS for Industry 4.0
- Apply iot and iot for Industry 4.0
- Analyze the various technologies of Industry 4.0
- Explain the data role in Industry 4.0
- Identify the Strategies of Industry 4.0

TEXT BOOKS

1. Alasdair Gilchrist, " Industry 4.0: The Industrial Internet of Things", Apress publications, 2016.
2. Arshdeep Bahga, "Internet of Things: A Hands-On Approach", Orient Blackswan Private Limited, Ist Edition, 2014.

REFERENCES

1. Achyut Godbole, " Industry 4.0 –AI, IoT, Blockchain", Madhushree publications, Ist Edition,2023.
2. Philip Kotler, Hermawan Karta Jaya, " Marketing 4.0: moving from traditional to digital" ,John Wiley publications, 2017.

E RESOURCES

1. https://archive.nptel.ac.in/courses/106/106/106106146/ (Introduction to industry 4.0)
2. https://archive.nptel.ac.in/courses/106/106/106106146/ (Cyber physical system)

19CCOX04 SOCIAL NETWORK ANALYSIS L T P C

3 0 0 3

OBJECTIVES

- To understand the concept of semantic web and related applications.
- To know the aggregation and knowledge representation.
- To learn knowledge representation using ontology.
- To understand human behavior in social web and related communities.
- To learn visualization of social networks.

UNIT I INTRODUCTION 9

Introduction to Semantic Web: Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION 9

Ontology and their role in the Semantic Web: Ontology–based knowledge Representation –Ontology languages for the Semantic Web: Resource Description Framework – Web Ontology Language –Modelling and aggregating social network data: State-of-the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIALNETWORKS 9

Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi- Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 9

Understanding and predicting human behavior for social communities – User data management – Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness –Privacy in online social networks – Trust in online environment – Trust models based on subjective logic– Trust network analysis – Trust transitivity analysis – Combining trust and reputation -Trust derivation based on trust comparisons – Attack spectrum and countermeasures.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node– Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare –Collaboration networks – Co-Citation networks.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Develop semantic web related applications.
- Understanding the aggregation and knowledge representation.
- Represent knowledge using ontology.
- Predict human behavior in social web and related communities.
- Visualize social networks.

TEXT BOOKS

1. Peter Mika, "Social Networks and the Semantic Web", 1 st Edition, Springer, 2017.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1 st Edition, Springer,2010.

REFERENCES

1. GuandongXu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", 1 st Edition, Springer, 2011.
2. Dion Goh and Schubert Foo , "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2018.

E–RESOURCES

1. https://nptel.ac.in/courses/106/106/106106169/ (Social Networks)

2. https://nptel.ac.in/noc/courses/noc17/SEM2/noc17–cs41/ (Social Networks–Introduction)

19CCOX05 **WEB DESIGNING** **L T P C**

3 0 0 3

OBJECTIVES

- To learn the principle of Web page design
- To study the basic concept of HTML and XML
- To introduce basics concept of CSS.
- To familiar the various applications using JavaScript.
- To provide the smart device based web application and deploy in different platforms.

UNIT I BASICS OF WEBSITE **9**

Internet Overview – web protocols – URL -Domain name – Web browsers and web servers - Basic principles of a web site - create a web site - Web Standards - Client and Server Scripting Languages, Responsive Web Designing, Types of Websites (Static and Dynamic Websites)

UNIT II HTML AND XML **9**

Basic structure of an HTML document - elements of HTML - Working with Text, Lists, Tables and Frames - Hyperlinks, Images and Multimedia - Forms and controls – Buttons – Form validation - Power of XML - Tools for Writing XML - Elements, Attributes, and Values - XSL and XSLT - Working with DTDs - Entities and Notations in DTDs – Validation Using DTDs

UNIT III CASCADING STYLE SHEETS **9**

Introduction to CSS - Types of CSS, - CSS Selectors - CSS Properties - CSS Styling - elements and objects - Lists and Tables - CSS Id and Class - Box Model - CSS framework

UNIT IV SCRIPTING LANGUAGES **9**

Introduction to JavaScript - Variables and Data types - Operators - Statements – Literals – Functions – Arrays – Exceptions – Form Validations in JavaScript – PHP – working principle of PHP – PHP variables constants – operators – Flow control and Looping – Arrays – strings – Functions – File handling – File uploading – sample PHP scripts -

UNIT V WEB PUBLISHING OR HOSTING **9**

Overview, SGML, Web hosting Basics, HTML, CGL, Documents Interchange Standards, Components of Web Publishing, Document management, Web Page Design Consideration, and Principles, Search and Meta Search Engines, WWW, Browser, HTTP, Publishing Tools.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Explain the basics principles of webpage design
- Design and edit images using HTML AND XML
- Integrate various tools and techniques using CSS.
- Implementing the scripting language in website
- Develop a website and publishing the website

TEXT BOOKS

1. Prof. Satis Jain, M. Geetha Iyer, "Web Designing and Publishing", BPB publications, 2020
2. Dr. Rupesh Shukla, "Web Designing", Ganga publishers and distributors, 2019.

REFERENCE BOOKS

1. Laura Lemay, Rafe Colburn, "Mastering HTML, XML, Java Script Web publishing", BPB publications, First Edition, 2016.
2. Tanweer Alam, " Web Designing and development", Hanna book publishers, 2017.

E RESOURCES

1. https://nptel.ac.in/courses/106/106/106106156/(Modern Application Development)
2. https://onlinecourses.swayam2.ac.in/aic20_sp11/preview/(HTML)

19CCOX06 CUSTOMER RELATIONSHIP MANAGEMENT L T P C

3 0 0 3

OBJECTIVES

- To study the need and importance of maintaining a good customer relationship.
- To understand the techniques involved in deciding upon customer relationship.
- To learn the CRM structures for better develop business application.
- To know the CRM implementation Techniques.
- To enhance the knowledge of various trends in CRM.

UNIT I INTRODUCTION 9

Definitions — Concepts and Context of relationship Management — Evolution — Transactional Vs Relationship Approach – CRM as a strategic marketing tool – CRM significance to the stakeholders.

UNIT II UNDERSTANDING CUSTOMERS 9

Customer information Database – Customer Profile Analysis – Customer perception, Expectations analysis – Customer behavior in relationship perspectives; individual and group customer's – Customer life time value – Selection of Profitable customer segments.

UNIT III CRM STRUCTURES 9

Elements of CRM – CRM Process – Strategies for Customer acquisition – Retention and Preventionof defection – Models of CRM – CRM road map for business applications.

UNIT IV CRM PLANNING AND IMPLEMENTATION 9

Strategic CRM planning process — Implementation issues — CRM Tools– Analytical CRM — Operational CRM – Call center management – Role of CRM Managers.

UNIT V TRENDS IN CRM 9

RM Solutions – Data Warehousing – Data mining for CRM – an introduction to CRM software packages.

TOTAL:45 PERIODS

OUTCOMES

Upon the completion of the course, Students will be able to:

- Explain the concept of CRM.
- Analyze about the different perceptions of customers.
- Identify the strategic customer acquisition and retention techniques in CRM.
- Illustrate about the CRM strategies and various tools.
- Implement trends in CRM techniques.

TEXT BOOKS

1. G.Shainesh, Jagdish, N.Sheth, "Customer Relationships Management Strategic Prespective", Macmillan, 2005.
2. Alok Kumaretal, "Customer Relationship Management: Concepts and applications", Biztantra, 2008.

REFERENCES

1. Zikmund, "Customer Relationship Management", Wiley, 2012 .
2. Kumar, "Customer Relationship Management – A Database Approach", Wiley India, 2007.

E – RESOURCES

1. https://nptel.ac.in/courses/110/105/110105145/ (Customer Relationship Management)
2. https://nptel.ac.in/noc/courses/noc20/SEM2/noc20–mg57 (Customer Relationship Management)

19CCOX07 CYBER CRIME INVESTIGATION AND DIGITAL FORENSICS L T P C

3 0 0 3

OBJECTIVES

- To learn cyber crime and forensics
- To understand cyber crime investigation
- To know about the digital forensics and its tools
- To understand the admissibility of evidence
- To learn to analyze and validate forensics data

UNIT I INTRODUCTION TO CYBER CRIME AND FORENSICS 9

Overview of cybercrime - impact- Introduction to digital evidence - forensic techniques - Legal and ethical cybercrime investigations- Fundamentals of Computer Forensics- Principles and methodologies of computer forensics- Chain of custody and forensic report writing.

UNIT II CYBERCRIME LAWS AND REGULATIONS 9

International and national cybercrime laws- Legal frameworks and jurisdictional challenges- Cybercrime investigation and prosecution procedures- Types of Cybercrime- Emerging trends and challenges.

UNIT III INVESTIGATIVE TECHNIQUES AND TOOLS 9

Open-source intelligence (OSINT) and data collection- Digital forensics tools and software- Network analysis and traffic monitoring- Encryption and decryption techniques- Cybercrime Investigation Process- Case studies of high-profile cybercrime incidents

UNIT IV FORENSIC ELECTRONIC EVIDENCE 9

Digital Evidence Collection - processing of digital evidence - digital images - damaged SIM and data recovery - multimedia evidence - retrieving deleted data - desktops, laptops and mobiles - retrieving data from slack space- renamed file- ghosting - compressed files.

UNIT V DIGITAL FORENSICS AND FORENSIC TOOLS 9

Introduction to Digital Forensics - hacking and cracking - credit card and ATM frauds - emerging digital crimes and modules Forensic Tools - Usage of Slack space - tools for Disk Imaging - Vulnerability Assessment Tools - Encase and FTK tools - Anti Forensics and probable counters - retrieving information

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Understand the basics of cyber crime and computer forensics
- Analyze and validate forensics data
- Apply a number of different computer forensic tools to a given scenario
- Discuss the processing of digital evidence
- Analyze and validate forensics data

TEXT BOOKS

1. Thomas J. Holt, Adam M. Bossler, "Cybercrime investigation and Digital forensics", Routledge Publishers, 2017.
2. Bill Nelson, Amelia Phillips, Christopher Stuart, "Guide to Computer Forensics and Investigations", Cengage Learning, India Sixth Edition, 2019.

REFERENCE BOOKS

1. John Vacca, "Computer Forensics ", Cengage Learning, 2005
2. MarjieT.Britz, "Computer Forensics and Cyber Crime: An Introduction", 3rd Edition, Prentice Hall, 2013.

E RESOURCES

1. https://onlinecourses.swayam2.ac.in/cec20_lb06/preview (Digital forensics)
2. https://onlinecourses.swayam2.ac.in/cec21_ge10/preview (cyber forensics)

19CCOX08 E – COMMERCE AND APPLICATIONS L T P C

3 0 0 3

OBJECTIVES

- To learn Efficient at selling through understanding complex consumer behavior.
- To learn national goals and aspirations as well as towards E-commerce infrastructure.
- To understand maximize conversion rates in E-business.
- To learn up-sell and cross-sell products and services to maximize value over the lifetime of the customer.
- To understand technical and economic challenges doing E-Marketing.

UNIT I INTRODUCTION 9

Introduction to Electronic Commerce — History of Electronic Commerce — Cutting edge – Electronic Commerce Framework – Evolution of E-commerce – Advantages and Disadvantage of E-commerce.

UNIT II NETWORK INFRASTRUCTURE 9

Network Infrastructure – The Internet Hierarchy – Basic Blocks of e-commerce – Networks layers & TCP/IP protocols – The Advantages of Internet – World Wide Web – E-commerce Infrastructure.

UNIT III E–COMMERCE INFRASTRUCTURE 9

An Overview of Hardware, Server Operating System, Software, Network Website – Managing the e- Enterprise – E-business Enterprise – Comparison between Conventional Design and E-organization.

UNIT IV PROCESS MODELS AND PAYMENT SYSTEMS 9

E-business Models Based on the Relationship of Transaction Parties – e-commerce Sales Life Cycle (ESLC) Model – Electronic Payment Systems – Electronic Cash – Smart Cards and Electronic Payment Systems.

UNIT V ELECTRONIC DATA INTERCHANGE(EDI) 9

EDI – History of EDI – EDI Working Concept – Implementation difficulties of EDI – Financial EDI – EDI and Internet – E-Marketing – The scope of E-Marketing.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Learn to Faster buying process and product listing creation.
- Use an affordable advertising and marketing.
- Flexibility for customers and price comparison.
- Give Faster response to buyer/market demands.
- Use an incorporate social element.

TEXT BOOKS

1. P.T. Joseph, "E-Commerce an Indian Perspective",3 rd Edition, Prentice–Hall of India, 2016.
2. O'Brien, "Management Information Systems",15 th Edition, Tata McGraw–Hill, 2018.

REFERENCES

1. J. F.Rayport, & B. J. Jaworski, "Introduction to E–Commerce", 2 nd Edition, New York McGraw–Hill Irwin.2013
2. R. M. Stair, & G. W. Reynolds, "Principles of Information Systems", 5 th Edition, Singapore Thomson Learning.2018

E–RESOURCES

1. https://nptel.ac.in/courses/110/105/110105083/ (E–Business)
2. https://nptel.ac.in/noc/courses/noc18/SEM1/noc18–ma04/l (Calculus for Economics, Commerce andManagement)

19CCT101 INFORMATION SECURITY FUNDAMENTALS L T P C

3 0 0 3

OBJECTIVES

- To understand the basics of Information Security.
- To know the legal, ethical and professional issues in Information Security.
- To know the aspects of risk management.
- To aware of various standards in this area.
- To know the technological aspects of Information Security.

UNIT I INTRODUCTION 9

History, what is Information Security? - Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues – An Overview of Computer Security – Access Control Matrix, Policy – Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk – Systems: AccessControl Mechanisms, Information Flow and Confinement Problem.

UNIT IV LOGICAL DESIGN 9

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

UNIT V PHYSICAL DESIGN 9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL: 45 PERIODS

OUTCOMES

Upon the completion of the course, Students will be able to:

- Apply the basics of information security.
- Illustrate the legal, ethical and professional issues in information security.
- Demonstrate the aspects of risk management.
- Identify the various standards in the Information Security System.
- Design and implementation of Security Techniques.

TEXT BOOKS

1. Michael Whitman, Herbert J. Mattord, "Management of Information Security", 5th Edition, CourseTechnology, 2017.
2. Micki Krause, Harold F.Tipton, "Handbook of Information Security Management",Vol 1–3, CRCPress LLC,2014.

REFERENCES

1. Stuart McClure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata Mc Graw– Hill, 2013.
2. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2012.

E–RESOURCES

1. https://nptel.ac.in/courses/106/106/106106129/ (Information Security Technologies)
2. http://www.nptelvideos.com/course.php?id=427 (Information Security)

19CCT201 ESSENTIALS OF CYBER SECURITY L T P C

3 0 0 3

OBJECTIVES

- To understand various types of cyber-attacks and cyber-crimes
- To learn threats and risks within context of the cyber security
- To have an overview of the cyber laws & concepts of cyber forensics
- To study the defensive techniques against these attacks
- To know about the data privacy concepts.

UNIT I INTRODUCTION TO CYBER SECURITY 9

Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance — Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-CyberWarfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT II CYBERSPACE AND THE LAW & CYBER FORENSICS 9

Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

UNIT III CYBERCRIME: MOBILE AND WIRELESS DEVICES 9

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV CYBER SECURITY: ORGANIZATIONAL IMPLICATIONS **9**

Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

UNIT V PRIVACY ISSUES **9**

Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc

TOTAL: 45 PERIODS

OUTCOMES

Upon the completion of the course, Students will be able to:

- Analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
- Interpret and forensically investigate security incidents
- Apply policies and procedures to manage Privacy issues
- Design and develop secure software modules
- Illustrate about the data privacy concepts.

TEXT BOOKS

1. Nina Godbole and Sunit Belpure, " Cyber Security Understanding Cyber Crimes, ComputerForensics and Legal Perspectives", Wiley publications, 2017.
2. K.S.Gupta, D.P.Agrawal, Haoxiang Wang, "Computer and Cyber Security: Principles, Algorithm,Applications, and Perspectives", CRC Press,2018.

REFERENCES

1. James Graham, Richard Howard and Ryan Otson, "Cyber Security Essentials", CRCPress, 2017
2. Chwan-Hwa(john) Wu, J. David Irwin, "Introduction to Cyber Security ", CRC Press , 2018.

E RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs127/preview (Cyber security concepts)
2. https://nptel.ac.in/courses/106106248 (Mobile and wireless computing)

GENERAL ELECTIVE

19NCCL01 NCC AIRFORCE LEVEL-1 L T P C

Course Prerequisites :75% Attendance in First Year of NCC 2 0 2 3

OBJECTIVES

- To learn about the basic structure of NCC and its organization, Incentives, duties of Cadets, imbibe the knowledge of various types of Camp.
- To motivate the cadets as confidence leaders by refining their personality and self- awareness, with the help of Communication skills and aware of creative, critical thinking abilities.
- To create a pool of organized, trained and motivated youth with leadership qualities in all walks of life from the exposure of great leaders and their history.
- To inspire the cadets to take part in the Social Service Activities and also motivate them to know about their role in the society towards the development of Nation.
- To acquire knowledge about the basics of health and hygiene, yoga, environment cleanliness and motivate young Indians towards the path of clean India and acquaint about obstacle training.

Unit I NCC GENERAL 6

Aims, objectives and Organization of NCC – incentives - duties of NCC Cadets - NCC camps - types - conduct.

Unit II PERSONALITY DEVELOPMENT 6

Personality Development – Factors - Self Awareness - Communication skills – Empathy - Critical and Creative thinking - Decision making.

Unit III LEADERSHIP 6

Leadership Capsule – Traits - Case studies - leaders like APJ Abdul Kalam, Ratan Tata, Shivaji, TipuSultan, Rabindranath Tagore, N Narayana murthy.

Unit IV SOCIAL SERVICE 6

Social Service Capsule – Basics - Rural development programmes – NGOs - Contribution of Youth - Swatch Bharath Abhiyan, Social evils - Drug Abuse - Digital Awareness - Waste Management - Women Health and Sanitation - Tree Plantation - Traffic Awareness - Pollution.

Unit V HEALTH AND HYGIENE **6**

Hygiene and sanitation – First Aid – Introduction to Yoga – Adventure – Environmental awareness and conservation – Obstacle Training -Adventure

PRACTICAL COMPONENT 10

S.No.	Name of the Experiment	CO Mapping	RBT
1	Foot Drill	CO1	Apply
2	Rifle Drill	CO1	Apply
3	Ceremonial Drill	CO2	Understand
4	Social Service and Community Development	t	

TOTAL : 35+10 = 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Understand the basic organization of NCC and roles, responsibilities of cadets for the smooth functioning of all camps.
- Develop the cadets personality and to think divergently to break functional fixedness.
- Identify the Leadership traits from the admiration and qualities of great leaders.
- Understand the concept and important of social service and influence them to spread awareness about various activities.
- Practice healthy practices to improve the personal sanitation and hygiene and get into the adventurous activities.

TEXT BOOKS

1. Cadet Hand Book (Specialized Subjects), published by DGNCC.
2. ANO Handbook

REFERENCES

1. Grooming tomorrow's Leaders, published by DG, NCC.
2. Youth in Action, published by DG,NCC.
3. The Cadet, Annual Journal of the NCC.
4. Précis Issued by respective Service Headquarters on specialized subject available to PI Staff asreference material.

E - RESOURCES

1. https://www.indiancc.nic.in
2. https://www.indiancc.mygov.in
3. https://www.play.google.com/MY _IAF
4. https://www.play.google.com/DGNCC_Training

19NCCL02 NCC AIRFORCE LEVEL – 2 L T P C

Course Prerequisites: 75% Attendance in Second Year of NCC 2 0 2 3

OBJECTIVES

- To realize the importance of national security and threats for the nation and aware of National Integration.
- To create interest in cadet to develop into great leaders by teaching them about problem solving techniques, handling emotions, time management skills.
- To aware of disaster management and motivate the young minds to help during the time of disasters.
- To create a pool of organized, trained and motivated youth with authoritative qualities to serve inIAF and to know the significance of Airmanship, Air Campaigns
- To learn about the Aero Modelling for better understanding of flying and also to choose the Armed Forces as a career.

Unit I NATIONAL INTEGRATION AND AWARENESS 6

National Integration and Awareness - importance and necessity - factors affecting National integration - Unity in Diversity - Threats to National Security.

Unit II PERSONALITY DEVELOPMENT 6

Problem solving- - Group Discussions-Coping with stress and emotions-Change your mindset-Time Management-Social skills-Team work-public speaking.

Unit III DISASTER MANAGEMENT 6

Disaster Management Capsule – Organization - Types -Essential services – Assistance – Civil Defense Organization. Initiative training - organizing skills - Dos and don'ts- Fire Services and FireFighting.

Unit IV GENERAL SERVICE KNOWLEDGE ON AIRCRAFT AND AIRMANSHIP 6

Armed forces and IAF Capsule-Modes of Entry in IAF-Aircraft types, capabilities and role-Air Campaigns-Principle of Flight-Forces acting on Aircraft-Airmanship – Navigation.

Unit V AERO MODELLING 6

Introduction and Types of Aero Engine — Aircraft Controls — Introduction to Radars — Aero modelling capsule – Flying/Building of Aero models – Micro Light Flying – Simulator Flying.

PRACTICAL COMPONENT 10

S.No.	Name of the Experiment	CO Mapping	RBT
1	Foot Drill	CO1	Apply
2	Rifle Drill	CO1	Apply
3	Weapon Assembling and Reassembling	CO2	Understand
4	Basics of Aero modelling	CO4	Apply

TOTAL: 35+10 = 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Realize the importance of National integration, threats and factors affecting the National Security.
- Demonstrate their public speaking skills and problem solving techniques
- Identify the problems during Disaster type and to give solutions during the emergency periods with their divergent thinking
- Grasp the concept of IAF and its importance to the nation and detailed Knowledge on Aircraft and Airmanship
- Obtain knowledge on Aero Modelling, handle of radars and insight about Aircraft, Aero models and flying.

TEXT BOOKS

1. Cadet Hand Book (Common Subjects), published by DGNCC.
2. Cadet Hand Book (Specialized Subjects), published by DGNCC.
3. ANO Hand Book

REFERENCES

1. Grooming tomorrow's Leaders, published by DG, NCC.
2. Youth in Action, published by DG,NCC.
3. The Cadet, Annual Journal of the NCC.
4. Précis Issued by respective Service Headquarters on specialized subject available to PI Staff asreference material.

E - RESOURCES

1. https://www.indiancc.nic.in
2. https://www.indiancc.mygov.in
3. https://www.play.google.com/MY _IAFs
4. https://www.play.google.com/DGNCC_Training

LIST OF HUMANITIES AND SOCIAL SCIENCES (HS) COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19HST101	Communicative Techno English –I	HS	3	0	0	3	40	60	100
19HST201	Communicative Techno English -II	HS	3	0	0	3	40	60	100

LIST OF BASIC SCIENCES (BS) COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19MAT101	Engineering Mathematics - I	BS	3	1	0	4	40	60	100
19CYE101	Engineering Chemistry	BS	3	0	2	4	50	50	100
19PHE101	Engineering Physics	BS	3	0	2	4	50	50	100
19CYT201	Environmental Science and Engineering	BS	3	0	0	3	40	60	100
19MAT201	Engineering Mathematics - II	BS	3	1	0	4	40	60	100
19PHT202	Solid State Physics and Nano Electronic Devices	BS	3	0	0	3	40	60	100
19MAT301	Transforms and Partial Differential Equation	BS	3	1	0	4	40	60	100
19MAT401	Probability and Queueing Theory	BS	3	1	0	4	40	60	100
19MAT501	Mathematical Foundations for Cyber Security	BS	3	1	0	4	40	60	100

LIST OF ENGINEERING SCIENCES (ES) COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
19GEE101	Computer Fundamentals and Python Programming	ES	3	0	2	4	50	50	100
19ECE301	Digital Electronics	ES	3	0	2	4	50	50	100
19ECT302	Analog and Digital Communication	ES	3	0	0	3	40	60	100
19GET101	Engineering Graphics	ES	3	0	0	3	40	60	100
19GET203	Basic Civil and Mechanical Engineering	ES	3	0	0	3	40	60	100

SCHEME FOR EEC & MC

List of Courses

LIST OF EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
Semester I									
19EEC101	Life Skills for Engineers	EEC	2	0	0	0	100	-	100
Semester II									
19EEC201	Technical Skill (Multimedia)	EEC	0	0	2	0	100	-	100
Semester III									
19EEC301	Communication Skills	EEC	0	0	2	0	100	-	100
Semester IV									
19EEC402	Entrepreneurship Development Activities	EEC	1	0	0	0	100	-	100
Semester V									
19EEC501	Quantitative Aptitude Learning	EEC	2	0	0	0	100	-	100
Semester VI									
19CCJ601	Mini Project	EEC	0	0	2	1	100	-	100
Semester VII									
19CCJ701	Project Phase I	EEC	0	0	2	1	100	-	100
Semester VIII									
19CCJ801	Project Phase II	EEC	0	0	20	10	100	-	100

LIST OF MANDATORY COURSES (MC)

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
Semester - I									
19MDC101	Induction Program (2 Weeks)	MC	-	-	-	-	-	-	-
Semester - II									
19MDC201	NSS/YRC/RRC	MC	-	-	-	-	100	-	100
Semester - III									
19MDC301	Leadership Enhancement Programme	MC	1	0	0	0	100	-	100
Semester - IV									
19MDC401	Value Added Course-I	MC	0	0	2	0	100	-	100
Semester - V									
19MDC501	Value Added Course-II	MC	0	0	2	0	100	-	100
Semester - VI									
19MDC601	Constitution of India	MC	3	0	0	0	100	-	100

CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2022-2023 onwards)

CREDIT SUMMARY

B.E. COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

Category	Sem1	Sem2	Sem 3	Sem 4	Sem 5	Sem 6	Sem 7	Sem 8	Total
HS	3	3	-	-	-	-	-	-	6
BS	12	10	4	4	4	-	-	-	34
ES	7	3	7	-	-	-	-	-	17
PC	-	4	10	18	19	15	7	-	73
PE	-	-	-	-	-	3	3	6	12
OE	-	-	-	-	-	3	3	-	6
EEC	-	-	-	-	-	1	1	10	12
MC	-	-	-	-	-	-	-	-	-
Total	22	20	21	22	23	22	14	16	160