CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B. Tech. I Year Syllabus

Common for ECE, AIM, CSM, CSC

I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	22MA101BS	Matrices and Calculus	3	1	0	4
2	22PH102BS	Applied Physics	3	1	0	4
3	22CS103ES	Programming for Problem Solving	3	0	0	3
4	22EN104HS	English for Skill Enhancement	3	0	0	3
5	22CS105ES	IT Workshop	0	0	3	1.5
6	22PH106BS	Applied Physics Laboratory	0	0	3	1.5
7	22CS107ES	Programming for Problem Solving Laboratory	0	0	2	1
8	22EN108HS	English Language and Communication Skills Laboratory	0	0	2	1
9	22CS109ES	Basic Elements of Engineering and Technology	0	0	2	1
		Induction Programme				
Total			**12**	**2**	**12**	**20**

S.No.	Course Code	Course Title	L	T	P	Credits
1	22MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22CH202BS	Engineering Chemistry	3	1	0	4
3	22CS203ES	Data Structures	3	0	0	3
4	22EC204ES	Basic Electrical and Electronics Engineering	3	1	0	4
5	22ME205ES	Computer Aided Engineering Graphics	1	0	2	2
6	22CH206BS	Engineering Chemistry Laboratory	0	0	2	1
7	22CS207ES	Data Structures Laboratory	0	0	2	1
8	22EC208ES	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
9	22CH209MC	Environmental Science	3	0	0	0
Total			**16**	**3**	**8**	**20**

CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B. Tech. II Year Syllabus (w. e. f. A.Y. 2022-23)

Computer Science and Engineering (Cyber Security)

III SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	22MA301BS	Computer Oriented Statistical Methods	3	1	0	4
2	22EC302ES	Digital Electronics	3	0	0	3
3	22CY303PC	Programming with Python	3	0	0	3
4	22CY304PC	Computer Organization and Architecture	3	0	0	3
5	22CY305PC	Object Oriented Programming through Java	3	0	0	3
6	22CY306PC	Python Lab	0	0	3	1.5
7	22CY307PC	Object Oriented Programming through Java Lab	0	0	3	1.5
8	22CY308PC	Data visualization-R Programming/ Power BI	0	0	2	1
9	22EN309MC	Gender Sensitization Lab	0	0	2	0
		Total	**15**	**1**	**10**	**20**

IV SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	22CY401PC	Discrete Mathematics	3	0	0	3
2	22CY402PC	Computer Networks	3	0	0	3
3	22CY403PC	Operating Systems	3	0	0	3
4	22MB404HS	Business Economics & Financial Analysis	3	0	0	3
5	22CY405PC	Software Engineering	3	0	0	3
6	22CY406PC	Computer Networks Lab	0	0	2	1
7	22CY407PC	OperatingSystems Lab	0	0	2	1
8	22CY408PC	Node JS/ React JS/Django	0	0	2	1
9	22CY409PC	Real-time Research Project/ Field Based Project	0	0	4	2
10	22EN410MC	Constitution of India	3	0	0	0
		Total	**18**	**0**	**10**	**20**

CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B. Tech. III Year Syllabus

Computer Science and Engineering (Cyber Security)

V SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	22CY501PC	Network Security and Cryptography	3	1	0	4
2	22CY502PC	Database Management Systems	3	0	0	3
3	22CY503PC	Formal Languages and Automata Theory	3	0	0	3
4		Professional Elective - I	3	0	0	3
5		Professional Elective - II	3	0	0	3
6	22CY504PC	Network Security and Cryptography Lab	0	0	2	1
7	22CY505PC	Database Management Systems Lab	0	0	2	1
8	22EN506HS	Advanced English Communication Skills Lab	0	0	2	1
9	22CY507PC	UI design- Flutter	0	0	2	1
10	22CY508MC	Intellectual Property Rights	3	0	0	0
		Total	**18**	**1**	**08**	**20**

VI SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	22CY601PC	Cyber Security Essentials	3	0	0	3
2	22CY602PC	Algorithm Design and Analysis	3	0	0	3
3	22CY603PC	Malware Analysis	3	0	0	3
4		Professional Elective – III	3	0	0	3
5		Open Elective - I	3	0	0	3
6	22CY604PC	Cyber Security Essentials Lab	0	0	2	1
7	22CY605PC	Malware Analysis Lab	0	0	2	1
8		Professional Elective – III Lab	0	0	2	1
9	22CY606PC	Industrial Oriented Mini Project / Summer Internship/ Skill Development Course (Big data-Spark)	0	0	4	2
10	22CH607MC	Environmental Science	3	0	0	0
		Total	**18**	**0**	**10**	**20**

Environmental Science in VI Sem Should Be Registered by Lateral Entry Students Only.

***MC – Pass/Fail**

Professional Elective - I

22CY511PE	Compiler Design
22CY512PE	Artificial Intelligence
22CY513PE	Data warehousing & Data Mining
22CY514PE	Ad-hoc & Sensor Networks
22CY515PE	Cloud Computing

Professional Elective - II

22CY521PE	Ethical Hacking
22CY522PE	Introduction To Data Science
22CY523PE	Distributed Systems
22CY524PE	Cyber Laws
22CY525PE	IoT Security

Professional Elective - III

22CY631PE	Mobile Application Security
22CY632PE	Machine Learning
22CY633PE	DevOps
22CY634PE	Mobile Application Development
22CY635PE	Blockchain Technology

Professional Elective – III Lab

22CY631PL	Mobile Application Security Lab
22CY632PL	Machine Learning Lab
22CY633PL	DevOps Lab
22CY634PL	Mobile Application Development Lab
22CY635PL	Blockchain Technology Lab

 # Courses in PE - III and PE - III Lab must be in 1-1 correspondence.

Open Elective – I

22CY611OE	Cyber Laws
22CY612OE	Ethical Hacking

Computer Science and Engineering (Cyber Security)

VII SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	22CY701PC	Vulnerability Assessment & Penetration Testing	3	0	0	3
2	22CY702PC	Network Management Systems and Operations	3	0	0	3
3		Professional Elective - IV	3	0	0	3
4		Professional Elective - V	3	0	0	3
5		Open Elective - II	3	0	0	3
6	22CY703PC	Vulnerability Assessment & Penetration Testing Lab	0	0	2	1
7	22CY704PC	Network Management Systems and Operations Lab	0	0	2	1
8	22CY705PR	Project Stage - I	0	0	6	3
		Total Credits	**15**	**0**	**10**	**20**

VIII SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	22MB801HS	Organizational Behavior	3	0	0	3
2		Professional Elective – VI	3	0	0	3
3		Open Elective – III	3	0	0	3
4	22CY802PC	Project Stage – II including Seminar	0	0	22	11
		Total Credits	**9**	**0**	**22**	**20**

***MC – Pass/Fail**

Professional Elective - IV

22CY741PE	Edge Analytics
22CY742PE	Web & Database Security
22CY743PE	Computer Security & Audit Assurance
22CY744PE	Social Media Security
22CY745PE	Deep Learning

Professional Elective - V

22CY751PE	Quantum Computing
22CY752PE	Data Analytics for Fraud Detection
22CY753PE	5G Technologies
22CY754PE	Security Incident & Response Management
22CY755PE	Authentication Techniques

Professional Elective - VI

22CY861PE	Quantum Cryptography
22CY862PE	IoT Cloud Processing and Analytics
22CY863PE	Cloud Security
22CY864PE	Digital Watermarking and Steganography
22CY865PE	Data Privacy

Open Elective – II

22CY721OE	Computer Security & Audit Assurance
22CY722OE	Social Media Security

Open Elective – III

22CY831OE	Data Privacy
22CY832OE	5G Technologies

Matrices and Calculus

B. Tech. I Semester **L T P C**

Subject Code: 22MA101BS **3 1 0 4**

Pre-requisites: Mathematical Knowledge at pre-universitylevel

Course Objectives: To learn

1. Types of matrices, their properties and concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of eigen values and eigenvectors and to reduce the quadratic form to canonical form.
3. Apply geometrical approach to the mean value theorems and their application to the mathematical problems and evaluation of improper integrals using Beta and Gamma functions.
4. Utilize partial differentiation, concept of total derivative and finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

Course Outcomes:

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

1. Use the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigenvectors and reduce the quadratic form to canonical form using orthogonal transformation.
3. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions.
4. Applythe extreme values of functions of two variables with/ without constraints.
5. Compute multiple integrals and applythe concept to find areas, volumes.

UNIT-I: Matrices [12 Lectures]

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations: solving system of Homogeneous and Non-Homogeneous equations, Gauss -elimination method, Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors [12 Lectures]

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Calculus [12 Lectures]

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem (without proof) with their Geometrical Interpretation and applications, Cauchy's Mean Value Theorem (without proof), Taylor's series for single variable.

Definition of improper integral: Definition of Beta and Gamma functions, properties, other forms of Beta functions, Relation between Beta and Gamma functions and their applications.

` **UNIT-IV: Multivariable Calculus (Partial Differentiation and Applications) [12 Lectures]**
Definitions of Limit and continuity. Partial Differentiation, Euler's Theorem; Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration) [12 Lectures]
Evaluation of Double integrals (Cartesian and Polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple integrals: Change of variables (Cartesian to polar) for double integrals.
Applications: Areas and volumes bydouble integrals.

TEXT BOOKS:

1. T.K.V.Iyengar, B.Krishna Gandhi, Engineering Mathematics, S.Chand Publishers, 19th edition,2020
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEdition,2018.
3. R.K. Jain and S.R.K. Iyengar, Advanced Engineering mathematics, Narosa Publications, 6th Edition, 2020.

REFERENCE BOOKS:

1. Erwin kreyzig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint,2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi publications, Reprint,2008.
4. H.K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S.Chand publishers, 2014.

Web Links:

1. https://www.mooc-list.com/tags/matrix
2. https://www.mooc-list.com/tags/mean-value-theorem

Applied Physics

B. Tech. I Semester **L T P C**

Subjects Code: 22PH102BS **3 1 0 4**

Prerequisites: 10 + 2 physics

Course Objectives: The objectives of this course for the student are to:

1. Understand the basic principles of quantumphysics and band theory of solids.
2. Summarize the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric and magnetic materials.
4. Identify the importance of nanoscale, quantumconfinement and various fabrications techniques.
5. Explain the characteristics of lasers and optical fibres.

Course Outcomes:

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

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identifythe role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric and magnetic materials for their applications.
4. Interpret the features and applications of nanomaterials.
5. Relate various aspects of Lasers and Optical fibres and their applications in diverse fields.

UNIT-I: QUANTUM PHYSICS AND SOLIDS [15 Lectures]

Quantum Mechanics: Introduction to quantum physics, Blackbody radiation, Planck's radiation law, Wein's and Rayleigh-Jean's law, Stefan-Boltzmann's law, Photo electric effect, De Broglie hypothesis, Davisson and Germer experiment, Heisenberg uncertainty principle, Born interpretation of the wave function, Time independent Schrodinger wave equation, Particle in one dimensional potential box.

Solids: Free electron theory (Drude and Lorentz, Sommerfield - qualitative), Fermi-Dirac distribution, Periodic potentials - Bloch's theorem, Kronig-Penney model (qualitative), E-K diagram, Effective mass of electron, Origin of energy bands- classification of solids.

UNIT-II: SEMICONDUCTORS AND DEVICES [15 Lectures]

Introduction to semiconductors, Intrinsic and extrinsic semiconductors - carrier concentration, Direct and indirect band gap semiconductors, Hall effect, Construction, Principle of operation and characteristics of P-N Junction diode, Zener diode, Bipolar junction transistor (BJT), LED, PIN diode, Avalanche photodiode (APD) and Solar cells.

UNIT-III: DIELECTRIC AND MAGNETIC MATERIALS [10 Lectures]

Dielectric Materials: Basic definitions, Electronic and ionic polarizations, Ferroelectric, Piezoelectric and Pyroelectric materials - applications.

Magnetic Materials: Hysteresis - soft and hard magnetic materials, Magnetostriction, Magneto resistance, Bubble memory devices, Magnetic field sensors and Multiferroics, Applications of magnetic materials.

UNIT-IV: NANO TECHNOLOGY [10 Lectures]

Nanoscale, Quantum confinement, Surface to volume ratio, Bottom-up fabrication: Sol-Gel, Precipitation, Combustion methods, Top-down fabrication: Ball milling, Physical vapor deposition (PVD), Chemical vapor deposition (CVD), XRD, SEM & TEM, Applications of nanomaterials.

UNIT-V: LASER AND FIBER OPTICS **[15 Lectures]**

Lasers: Laser beam characteristics, three quantum processes, Einstein coefficients and their relations, Lasing action, Pumping methods, Ruby laser, Nd-YAG laser, He-Ne laser, Semiconductor laser, Applications of laser.

Fiber Optics: Introduction to optical fibers, Total internal reflection, Construction of optical fiber, Numerical aperture, Acceptance angle, Classification of optical fibers, Losses in optical fiber, Optical fiber for communication system, Applications of optical fibers.

TEXT BOOKS:

1. M.N.Avadhanulu, P.G.Kshirsagar & TVS. Arun Murthy" A Textbook of Engineering Physics"- S.Chand Publications, 11th Edition, 2019.
2. Shatendra Sharma and Jyotsna Sharma, Engineering Physics, Pearson Publication, 2019.
3. Donald A, Neamen, Semiconductor Physics and Devices-Basic Principle–Mc Graw Hill, 4thEdition, 2021.
4. B.K.Pandey and S.Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition, 2022.
5. Narasimha Reddy Katta, Essentials of Nanoscience & Nanotechnology, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. H.C.Verma, QuantumPhysics, TBS Publication, 2ndEdition2012.
2. Halliday, Resnickand Walker, John Wiley & Sons, Fundamentals of Physics 11thEdition, 2018.
3. Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 2019.
4. S.L.Gupta and V.Kumar, Elementary Solid State Physics, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya – Nano Materials, New Age International, 1stEdition, 2007.

Web Links:

1. https://youtu.be/TcmGYe39XG0
2. https://youtu.be/JA3sCmrv11M
3. https://youtu.be/qUEbxTkPIWI

Programming for Problem Solving

B. Tech. I Semester	L	T	P	C
Subject Code: 22CS103ES	3	0	0	3

Prerequisites: Basic knowledge on mathematics & problem solving skills.

Course Objectives:

1. Design solutions to simple engineering problem by applying the basic programming principles of C language and basic mathematical knowledge.
2. Implement the programs using conditional statements and loops.
3. Develop simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.
4. Develop the programs of searching and sorting techniques using Arrays.

Course Outcomes: After completion of this course, the students will be able to:

1. Illustrate and explain the basic computer concepts, algorithms, flowcharts and programming principles of C Language.
2. Develop C programs to solve simple mathematical and decision making problems.
3. Understand, distinguish and implement arrays, strings and structures to write C programs.
4. Understand the concepts of pointers and files using C programs.
5. Decompose a problem into functions and to develop modular reusable code.
6. Understand the Searching and sorting problems.

UNIT – I: [10 Lectures]

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, types of computer languages, compilers, creating, compiling and executing a program etc., Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart with examples.

Introduction to C Programming Language: History, Basic Structure of a C program, variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, type conversion, Bitwise operations: Bitwise AND, OR, XOR and NOT operators. I/O: Simple input and output with scanf and printf.

UNIT - II: [12Lectures]

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, go to, Iteration with for, while, do- while loops

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays

Strings: Introduction to strings, handling strings as array of characters, basic string handling functions available in C .

Structures: Defining structures, initializing structures, Nested structures, Array of structures

Unions: Defining Unions, initializing unions, basic program on union. Enumeration data type.

UNIT - III: [10 Lectures]

Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation).

Pre-processor: Commonly used Pre-processor commands like include, define, undef, if, ifdef, ifndef

Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Random access using fseek, ftell and rewind functions.

UNIT - IV: [12 Lectures]

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, categories of functions, passing parameters to functions, call by value, Passing arrays to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions, Storage classes (auto, extern, static and register), The main method and command line arguments.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: [8 Lectures]

Basic searching in an array of elements (linear and binary search techniques).Basic algorithms to sort arrayof elements (Bubble, Insertion and Selection sort algorithms).

TEXT BOOKS:

1. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, 3rd edition,2006.
2. Jeri R. Hanlyand Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson,2006.

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,Prentice Hall of India
2. R.G. Dromey, How to solve it byComputer, Pearson(16thImpression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, PearsonEducation.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill,4thEdition

Web Links:

1. https://nptel.ac.in/courses/106104074
2. https://onlinecourses.nptel.ac.in/noc21_cs01/preview
3. https://www.includehelp.com/c-programming-examples-solved-c-programs.aspx
4. https://www.programiz.com/c-programming.

English for Skill Enhancement

B. Tech. I Semester **L T P C**

Subject Code: 22EN104HS **3 0 0 3**

Prerequisites: Basic knowledge in Grammar as well as in prose

Course Objectives:

This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary,Grammar, Reading and Writing skills
2. Develop studyskills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

Course Outcomes:

After completion of the course, the students will be able to:

1. Understand the importance of vocabularyand sentence structures.
2. Demonstrate their understanding of the rules of functional grammar.
3. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
4. Develop comprehension skills from the known and unknown passages.
5. Acquire basic proficiencyin reading and writing modules of English.

UNIT – I **[8 Lectures]**

Chapter entitled '*Toasted English*' byR.K. Narayan from *"English: Language, Context and Culture"* published byOrient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes -Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives- Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT – II **[7 Lectures]**

Chapter entitled **'Appro JRD' by Sudha Murthy** from ***"English: Language, Context and Culture"published*** byOrient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT – III **[8 Lectures]**

Chapter entitled 'Lessons from Online Learning' byF. Haider Alvi, Deborah Hurst et al from *"English: Language, Context and Culture"* published by Orient BlackSwan, Hyderabad.
Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.
Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT – IV **[8 Lectures]**

Chapter entitled 'Art and Literature' by Abdul Kalam from *"English: Language, Context and Culture"* published byOrient BlackSwan, Hyderabad.
Vocabulary: Standard Abbreviations and Acronyms in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice
Writing: Writing Practices- EssayWriting-Writing Introduction and Conclusion -Précis Writing.

UNIT – V **[7 Lectures]**

Chapter entitled 'Go, Kiss the World' by Subroto Bagchi from *"English: Language, Context and Culture"* published byOrient BlackSwan, Hyderabad.
Vocabulary: Technical Vocabularyand their Usage
Grammar: Common Errors in English
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum arecovered in the syllabus of ELCS Lab Course.

- **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B. Tech. First Year is* ***Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- **Note**: **2**. Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

TEXT BOOK:

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. Interchange Series. Introduction, 1,2,3. Cambridge University Press. (2022)
3. Wood, F.T. Remedial English Grammar. Macmillan. (2007).

4. Chaudhuri, Santanu Sinha. Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd. (2018).
5. Technical Communication. Wiley India Pvt. Ltd. (2019).
6. Vishwamohan, Aysha. English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd. (2013).
7. Swan, Michael. Practical English Usage. Oxford University Press. Fourth Edition. (2016).

Web Links:

UNIT I

Vocabulary - Prefixes and Suffixes
WL1:https://nptel.ac.in/courses/109106094/23
WL2:http://teacher.scholastic.com/reading/bestpractices/vocabulary/pdf/prefixes_suffixes.pdf

Synonyms and Antonyms

WL3:https://www.google.com/search?q=Synonyms+an+Antonyms+-+nptel+videos&nfpr=1&sa=X&ved=0ahUKEwi7pbzfluXfAhXBEbwKHXOqC4oQvgUILCgB&biw=1024&bih=657
WL4:https://scoop.eduncle.com/synonyms-antonyms-for-competitive-exams

GRAMMAR - Common errors in Prepositions

WL5:https://nptel.ac.in/courses/109104030/Module12/Lecture39.pdf
WL6:https://nptel.ac.in/courses/109104030/Module12/Lecture38.pdf
WL7:https://www.englishpractice.com/common-mistakes/common-errors-prepositions-3

Techniques of Effective reading

WL8:https://nptel.ac.in/courses/109106129/5
WL9:https://nptel.ac.in/courses/109106129/15
WL10:https://www.howtolearn.com/2012/08/different-reading-techniques-and-when-to-use-them/

UNIT II

GRAMMAR - Common errors in Noun and Pronoun agreement
WL11:https://nptel.ac.in/courses/109104030/Module12/Lecture39.pdf

common errors and Rules of Subject-verb agreement

WL12:https://nptel.ac.in/courses/109106094/8
https://www.grammarbook.com/grammar/subjectVerbAgree.asp

Techniques for improving comprehension skills

WL13:**https://nptel.ac.in/courses/109106129/5**
WL14:**https://joshkaufman.net/3-simple-techniques-to-optimize-your-reading-comprehension-and-retention/**

UNIT III

English Language
Vocabulary - Affixes
WL15:http://www.prefixsuffix.com/rootchart.php

English words from Foreign languages

WL16:https://www.fluentu.com/blog/english/english-words-from-other-languages/
WL17:https://en.oxforddictionaries.com/explore/foreign-words-and-phrases/
Misplaced modifiers
WL18:https://www.grammar-monster.com/glossary/misplaced_modifier.htm

Reading

WL19:http://www.bbc.co.uk/skillswise/topic/skimming-and-scanning
WL20:http://www.bbc.co.uk/skillswise/video/skimming-and-scanning

Writing

WL21:https://writeshop.com/choosing-vocabulary-to-describe-a-place/

Writingformal letters

WL22:https://nptel.ac.in/courses/109104031/14

UNIT IV
Vocabulary
WL23:https://www-pub.iaea.org/MTCD/DSS/OASISGlossary.pdf
WL24:https://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Composite%20Materials/pdf/Glossory.pdf
WL25:https://nptel.ac.in/courses/117105083/pdf/ssg_m2l2.pdf

Reading
WL26:https://nptel.ac.in/courses/109106066/module6/lecture12/lecture12.pdf

Writing
WL27:https://nptel.ac.in/courses/109106094/29
WL28:https://nptel.ac.in/courses/109106066/module3/lecture6/lecture6.pdf

UNIT - V
Vocabulary
WL29:https://nptel.ac.in/courses/109106066/module1/lecture1/lecture1.pdf

Grammar - Common errors
WL30:https://www.engvid.com/english-resource/50-common-grammar-mistakes-in-english/

Reading
WL31:https://nptel.ac.in/courses/109106066/module6/lecture12/lecture12.pdf

Writing
WL32:https://nptel.ac.in/courses/109104031/17
WL33:https://nptel.ac.in/courses/109107121/31

IT Workshop

B. Tech. I SEM **L T P C**

Subject Code: 22CS105ES **0 0 3 1.5**

Course Objectives:

1. The IT Workshop is a traininglab course to get trainingon PC Hardware, Internet &Worldwide Web and Productivitytools for documentation, Spreadsheet computations andPresentation.
2. To introduce to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers, hardware and software level troubleshooting process.
3. To introduce connecting the PC on to the internet from home and workplace and effectively usage of the internet, Usage of web browsers, email, newsgroups and discussion forums.
4. To get knowledge in awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks.
5. To introducethe usage of Productivitytools in craftingprofessional word documents, excel spreadsheets and power point presentations using open office tools.

Course Outcomes:

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

1. Applyknowledge for PC hardware and computer parts.
2. Applyknowledge for computer assembling and software installation.
3. Abilityhow to solve the trouble shooting problems.
4. Applythe tools for preparation of project certificate, Creating a Newsletter.
5. Applythe tools for preparation of PPT, Documentation and budget sheet etc.

PC Hardware: The students should work on working PC to disassemble and assemble to working condition and install operating system like Linux or any other on the same PC. Students are suggested to work similar tasks in the laptop scenario wherever possible.

Problem 1: Every student should identify the peripherals of a computer, components in a CPUand its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

Problem 2: Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

Problem 3: Hardware Troubleshooting: Students have to be given a PC which does not bootdue to improper assembly or defective peripherals. They should identify the problem and fixit to get the computer back to working condition.

Problem 4: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. Internet & World Wide Web.

Problem 5: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finallystudents should demonstrate how to access the websites and email.

Problem 6: Web Browsers, Surfing the Web: Students customize their web browsers with

the LAN proxy settings, bookmarks, search toolbars and popup blockers. Also, plug- ins like Macro media Flash and JRE for applets should be configured.

Problem 7: Search Engines & Netiquette: Students should know what search engines are and howto use the search engines. Usage of search engines like Google, Yahoo, ask.com and others should be demonstrated by student.

Problem 8: Cyber Hygiene: Students should learn about viruses on the internet and install antivirus software. Student should learn to customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Problem 9: Develop home page: Student should learn to develop his/her home page using HTMLconsisting of his/her photo, name, address and education details as a table and his/her skill set as a list. Productivitytools: Word Orientation: An overview of Microsoft (MS) office /equivalent (FOSS) tool word should be learned: Importance of MS office / equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that should be covered in each, using and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Problem 10: Using and Word to create project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs in word.

Problem 11-Spreadsheet Orientation: Accessing, overview of toolbars, saving spreadsheet files, Using help and resources, Creating a Scheduler: - Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Calculating GPA - Features to be covered: - Cell Referencing, Formulae in spread sheet – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyperlinking, Count function, Sorting, Conditional formatting.

Problem 12: Creating Power Point: Student should work on basic power point utilities and tools in Latex and MS Office/equivalent (FOSS) which help them create basic power point presentation. PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting Images, Tables and Charts.

REFERENCEBOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education. LaTeX Companion – Leslie Lamport, PHI/Pearson.
2. Comdex Information Technologycourse tool kit Vikas Gupta, WILEY Dreamtech
3. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft)

Applied Physics Laboratory

B. Tech I Semester **L T P C**

Subject Code: 22PH106BS **0 0 3 1.5**

Prerequisites: Practical physics at basic level.
Co-Prerequisite: A course on 'Applied physics laboratory'.

Course Objectives: The objectives of this course for the student to

1. Capable of handling instruments related to photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, BJT, LED, solar cell, Hall effect and measurement of energy gap and resistivity of semiconductor materials.
3. To understand the characteristics of dielectric constant of a given material and study the behavior of B-H curve of ferromagnetic materials.
4. Understand the Characteristics of Laser and optical fiber measurements.
5. Understanding the method of Mechanical oscillator (Torsional) and electrical oscillator (LCR).

Course Outcomes:

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

1. Know the determination of the Planck's constant using Photoelectric effect.
2. Appreciate quantum physics in semiconductor devices, optoelectronics and identify the material whether it is n-type or p-type by Hall experiment.
3. Gain the knowledge of applications of dielectric constant and understand the variation of magnetic field and behavior of hysteresis curve.
4. Gain the knowledge of Characteristics of Laser and optical fiber measurements.
5. Carried out data analysis.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck's constant using photoelectric effect.
2. To studythe resonant frequency, bandwidth and quality factor of series and parallel LCR circuits.
3. To studythe V-I characteristics of a p-n junction diode.
4. a. To studythe V-I characteristics of solar cell.
   b. To studythe V-Icharacteristics of light emitting diode (LED).
5. Determination of energygap of a semiconductor.
6. a. Determination of the V-Icharacteristics of the given LASER beam.
   b. Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
7. Determination of dielectric constant of a given material.
8. StudyB-H curve of a magnetic material.
9. Determination of the resistivityof semiconductor bytwo probe method.
10. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
11. Input and output characteristics of BJT(CE,CB & CC configurations).
12. Understanding the method of least squares torsional pendulum as an example.

Note: *Any 8 experiments are to be performed.*

REFERENCE BOOK:

1. S. Balasubramanian, M.N.Srinivasan "A Textbook of Practical Physics"- S Chand Publishers, 2017.

Programming for Problem Solving Laboratory

B. Tech. I Semester **L T P C**

Subject Code: 22CS107ES **0 0 2 1**

Co-requisites: A course on Programming for problem solving.
Pre-requisites: Basic knowledge on mathematics & problem solving skills.

Course Objectives: The students will learn the following:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems byunderstanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.

Course Outcomes:

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

1. Develop C programs for simple numerical problems.
2. Applythe knowledge of conditional statements and loops in programs.
3. Implement the programs using the concepts of arrays, structures, pointers and files.
4. Create the programs using functions and recursive functions.
5. Implement searching and sorting algorithms.

Practice sessions:

a) Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input.

b) Writeasimpleprogramthatconvertsonegivendatatypetoanotherusingautoconversionand casting. Take the values from standard input.

Simple numeric problems:

a) Write a program for finding the max and min from the three numbers.

b) Write the program for the simple, compound interest.

c) Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

d) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

5 x 1 = 5
5 x 2 =10
5 x 3 =15

e) Write a C program for binary equivalent to a positive number 0 to 255.

Expression Evaluation:

a) Write a C program, which takes two integer operands and one operator from the user,

performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

b) Write a program that finds if a given number is a prime number
c) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
e) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
f) Write a C program to find the roots of a Quadratic equation.

Arrays, Pointers and Functions:

a) Write a C program to find the minimum, maximum and average in an array of integers.
b) Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
c) Write a C program that uses functions to perform the following:
d) Addition of Two Matrices
e) Multiplication of Two Matrices
f) Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
g) Write C programs that use both recursive and non-recursive functions
h) To find the factorial of a given integer.
i) To find the GCD (greatest common divisor) of two given integers.
j) To find x^n

Files:

a) Write a C program to display the contents of a file to standard output device.
b) Write a C program which copies one file to another file..
c) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:

a) Write a C program to implement string handling functions.
b) Write a C Program to find the length of a given string without using strlen() function.
c) Write a C Program to concatenate two string without using a function.

Miscellaneous:

a) Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * *
                                 4 4 4 4    *
                                            * *
                                            *
```

Sorting and Searching:

a) Write a C program that uses non-recursive function to search for a Keyvalue in a given List of integers using linear search method.
b) Write a C program that uses non-recursive function to search for a Keyvalue in a given Sorted list of integers using binary search method.

c) Write a C program that implements the Bubble sort method to sort a given list ofIntegers in ascending order.

d) Write a C program that sorts the given array of integers using selection sort in descending order

e) Write a C program that sorts the given arrayof integers using insertion sort in ascending order

TEXT BOOKS:

1. Jeri R. Hanlyand Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson,2013.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition),2006.

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition,McGraw-Hill.

English Language and Communication Skills Lab

B. Tech. I Semester **L T P C**

Subject Code: 22EN108HS **0 0 2 1**

Prerequisites: Basic Knowledge in speech sounds as well as formal and informal communication

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunityfor practice in speaking
4. To improve the fluencyof students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

Course Outcomes:

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

1. Pronounce English sounds according to standard pronunciation
2. Understand the nuances of English language through audio- visual experience and practice
3. Speak with clarityand confidence which in turn enhances their employability skills
4. Neutralize their accent for intelligibility
5. Participate in discussion and presentation effectively and confidently

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a) Computer Assisted Language Learning (CALL) Lab

b) Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

1. To enable students to develop their listening skills so that theymay appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessarytraining in listening, so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
    - Oral practice
    - Describing objects/situations/people
    - Role play– Individual/Group activities
    - Just A Minute (JAM) Sessions

The following course content is prescribed for the **English Language and communication Skills Lab**.

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types

***Practice*:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English**.**

Practice: **Ice-**Breaking Activityand JAM Session- Situational Dialogues – Greetings – Taking Leave –Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Listening Skills: Barriers- Effective Listening.

Practice: Minimal Pairs-Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises*

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice*:* Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise-III

CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - *Testing Exercises*

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab:

Understand: Errors in Pronunciation-Neutralization of Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -*Testing Exercises*

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab:

Understand: Listeningfor General and Specific Details.

Practice: ListeningComprehension Tests -*Testing Exercises*

ICS Lab:

Understand: Introduction to Group Discussion

Practice: Group Discussion

MinimumRequirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-studybystudents.

SystemRequirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration

ii) High FidelityHeadphones

2. **Interactive Communication Skills (ICS) Lab :**

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

Source of Material (Master Copy):

- *Exercises in Spoken English. Part 1,2,3*. CIEFL and Oxford UniversityPress

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easyby Darling Kindersley.
- Punctuation Made Easyby Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabularyin Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS:

1. *English Language Communication Skills – Lab Manual cum Workbook.* Cengage Learning India Pvt. Ltd. (2022).
2. Shobha, KN & Rayen, J. Lourdes. *Communicative English – A workbook.* Cambridge University Press. (2019).
3. Kumar, Sanjay & Lata, Pushp. *Communication Skills: A Workbook.* Oxford University Press. (2019).
4. Board of Editors.*ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient Black Swan Pvt. Ltd. (2016).
5. Mishra, Veerendra et al. *English Language Skills: A Practical Approach.* Cambridge University Press. (2020).

WEB LINKS:

Listening Skills Lecture nptel
WL1:https://www.youtube.com/watch?v=JIKU_WT0Bls

NPTEL on role-play and conversation skills
WL2:https://www.youtube.com/watch?v=0AM35Nu5McY&list=PLbMVogVj5nJT3a24lj4KOkQCOElxcDQrs

NPTEL on syllables
WL3:https://www.youtube.com/watch?v=4V2CwQJ8pgc

NPTEL on listening for general details
WL4:https://www.youtube.com/watch?v=xY7z3nZOHqk&list=PLzJaFd3A7DZtnTdtOxvjO3GLPd1WVe6oq&index=17

NPTEL on stress shifts
WL 5: https://www.youtube.com/watch?v=_KHtfvob4j4

NPTEL on weak forms and strong forms
WL6:https://www.youtube.com/watch?v=VM0cNDxBySc&list=PL0P6HKIuShRnJeZjhAOy-2NejNjeC2_x2

WL7:NPTEL on Intonation
https://www.youtube.com/watch?v=A6aE4nceJt8

Basic Elements of Engineering Technology

B. Tech. I Semester **L T P C**

Subject Code: 22CS109ES **0 0 2 1**

Objectives:

- Exploring different engineering technologies and their applications.
- Students should able to learn various 3d printing technologies.
- Knowledge towards Assembling and testing of robots.
- Understanding functionality of 3Dprinters and their application.
- Developing team work and in sight towards different disciplines of Engineering.

Module I: Internet of Things

Overview of IoT and Architecture: Brief History, evolution of IoT, Architecture, trends in the Adoption of IoT, Societal Benefits of IoT, Risks, Privacy, Security, Embedded Systems Components, Micro-controller Architecture and Properties and Installing and Setting up the Arduino and Raspberry Pi (RPi) development environment. Build Simple IoT Applications by using Arduino or RPi.

Module II: Robotics

Introduction, Different types of robots, Components of a Robot, Working principle of robots, Applications of robots in various fields, Innovation challenges, Scope of robotics research & its current trends, assembling and testing of Robot.

ModuleIII:3D Printing

Introduction, Product Design & Development, 3D Scanning & Printing using different types of materials. Components of 3D Printer, Applications of 3D printed products in various fields, Hands on Experience on 3D printing Machine.

ModuleIV: Softwareand Post Processing

Cura, Flash print, 3dslicer, Tinkercad, Meshmixer. 3d printing parameters, print Speed, Layer Height, Infill density.Acetone bathing, Support Structure Removing.

Module V: Case Studies

Students has to submit a report by doing a study on various Engineering applications related to Manufacturing, Retail, Automotive, Logistics, Healthcare, Entertainment and E-Governance.

REFERENCE BOOKS:

1. PC Hardware-A Handbook –KateJ. Chase PHI(Microsoft)
2. ITEssentialsPCHardwareandSoftwareCompanionGuideThirdEditionbyDavid Anfinsonand Ken Quamme.– CISCO Press, Pearson Education.
3. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015,ISBN: 9788173719547.

4. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace,O'Reilly (SPD),2014,ISBN: 9789350239759
5. Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression,2010.
6. DebSR.andDebS.,—RoboticsTechnologyandFlexibleAutomation‖,TataMcGr awHill Education Pvt.Ltd,2010.
7. MikellP Groover,—Automation, Production Systems,and computerintegrat edManufacturing‖,PrenticeHall, 2001.
8. CheeKaiChua,KahFaiLeong,3DPrintingandAdditiveManufacturing:Principles andApplications: Fourth Edition of Rapid Prototyping.
9. Andreas Gebhardt, Understanding Additive Manufacturing: RapidPrototyping, Rapid Tooling

Ordinary Differential Equations and Vector Calculus

B. Tech. II Semester **L T P C**

Subject Code: 22MA201BS **3 1 0 4**

Pre-requisites: Mathematical Knowledge at pre-universitylevel

Course Objectives: To learn

1. Methods of solving the differential equations of first order differential equations.
2. Methods of solving the differential equations of higher order differential equations.
3. Concept, properties of Laplace transforms and Solving ordinary differential equations using Inverse Laplace transforms techniques.
4. The physical quantities of vector valued functions involved in engineering field
5. The basic properties and their applications to line and surface integrals.

Course outcomes: After learning the contents of this paper the student must be able to

1. Identifywhether the given differential equation of first order is exact or not.
2. Solve higher order differential equations.
3. Use Laplace transforms techniques to find the derivatives and integrals of given functions & inverse Laplace transforms techniques for solving ODE's
4. Analyze vector and scalar point functions.
5. Evaluate the line and surface integrals and converting them from one to another

UNIT-I: First Order ODE **[12 Lectures]**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (onlyin Cartesian Coordinates).

Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order **[12 Lectures]**

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax},sin$a$x, cosax, polynomials in x, $e^{ax}V(x)$and $xV(x)$, method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: Laplace transforms **[16 Lectures]**

Laplace Transforms: First shifting theorem and Change of scale property, Multiplication by' t' and division by 't', Laplace transforms of derivatives and integrals .Laplace transform of periodic functions. Inverse Laplace transforms: First Shifting theorem, Change of Scale Property, Inverse Laplace transforms of derivatives and Integrals, convolution theorem(without proof). Applications: Solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation **[10 Lectures]**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional

derivatives, Tangent plane and normal line, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration [10 Lectures]

Line, Surface &Volume integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. B.S.Grewal, Higher Engineering Mathematics,KhannaPublishers,36th Edition,2021
2. R.K.JAIN, S.R.K.Iyengar,Advanced Engineering Mathematics,.Narosa Publishing House, 4th Edition New Delhi,2020
3. T.K.V.Iyengar, B.Krishna Gandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, S.Chand Publishing

REFERENCE BOOKS:

1. Kreyszing,Advanced Engineering Mathematics,.JohnWiley&Sons, 9th Edition 2006.
2. G.B.Thomas and R.L.Finney, Calculus and Analytic geometry,9th Edition,Pearson,Reprint,2002.
3. H.K.Dass and Er.Rajnish verma,Higher Engineering Mathematics,S Chand and Company Limited,New Delhi.
4. N.P.Bali and Manish Goyal,A text book of Engineering Mathematics, Laxmi Publocations,Reprint,2008

Web Links:

1. https://nptel.ac.in
2. https://onlinecourses.nptel.ac.in

Engineering Chemistry

B. Tech. II Semester **L T P C**

Subject Code: 22CH202BS **3 1 0 4**

Prerequesities: Engineering chemistryknowledge in school and college level.

Course Objectives:

To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.

1. To include the importance of water in industrial usage.
2. Analyze the properties and applications of industrial polymers.
3. Fundamental aspects of batterychemistry, significance of corrosion its control to protect the structures.
4. To imbibe the basic concepts of petroleum and its products.
5. To acquire required knowledge about engineering materials like cement, smart materials andLubricants.

Course Outcomes:

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

1. Identifythe basic properties of water and its usage in domestic andindustrial purposes.
2. Learn the fundamentals and general properties of polymers and other engineeringmaterials. Apply in day to day life.
3. Make use of basic knowledge of electrochemical procedures related to corrosionand its control.
4. Interpret the concepts of petroleum products and cement, Smartmaterials.
5. Find potential applications of chemistry and practical utility in order to becomegood engineers and entrepreneurs.

UNIT - I: Water Chemistry [8 Lectures]

Introduction to hardness of water – Estimation of hardness of water by complexometric method and numerical problems. Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation – Removal of F^- ion in water by Nalgonda method. Desalination of water – Reverse osmosis.

UNIT – II : Polymers [8 Lectures]

Definition – Classification of polymers with examples – Types of polymerization –addition (free radical addition) and condensation polymerization with examples – Nylon 6:6.

Plastics: Definition and characteristics - thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite.

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, andThiokol rubber.

Biodegradable polymers: Concept and advantages - poly vinyl alcoholand their applications.

Conducting polymers: Characteristics and Classification with examples - mechanism Of conduction intrans - polyacetylene and applications of conducting polymers.

UNIT - III: Batteries & Corrosion [8 Lectures]

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Construction, working and applications of Lithium, Lithium ion and Zn-air battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells-Construction and applications of Methanol Oxygen fuel cell.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods. Metallic coating methods: Galvanization, Tinning and Eelectroplating

UNIT - IV: Energy Sources: [8 Lectures]

Introduction, Classification- Calorific value of fuel – HCV, LCV- Dulongs formula. solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Trans esterification, advantages.

UNIT - V: Engineering Materials: [8 Lectures]

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermo response materials- Polyacryl amides, Polyvinyl amides.

Lubricants: Classification of lubricants with examples-characteristics Of good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure) properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

TEXT BOOKS:

1. P.C. Jain and M. Jain, Engineering Chemistry by Dhanpatrai Publishing Company, 2010.
2. Rama Devi, Venkata Ramana Reddy and Rath, Engineering Chemistry by Cengage learning,2016.
3. Jaya Shree Anireddy, Textbook of Engineering Chemistryby Wiley Publications.
4. M. Thirumala Chary, E. Laxminarayana and K.Shashikala, A text book of Engineering Chemistry by Pearson Publications, 2021.

REFERENCE BOOKS:

1. Shikha Agarwal, Engineering Chemistryby Cambridge University Press, Delhi 2015.
2. Shashi Chawla, Engineering Chemistry by Dhanpatrai and Company (P) Ltd. Delhi 2011.

Web Links

1. https://nptel.ac.in/courses/122106030
2. https://in.coursera.org/learn/corrosion
3. https://onlinecourses.nptel.ac.in/noc20_cy21/preview
4. https://archive.nptel.ac.in/courses/103/105/103105110/

Data Structures

B. Tech. II Semester **L T P C**

Subject Code: 22CS203ES **3 0 0 3**

Prerequisites: A Course on "Programming for problem solving".

Course Objectives:

1. Exploring basic data structures such as stacks and queues.
2. Introduces a varietyof data structures such as hash tables.
3. Discussion of search trees.
4. Understand the sorting algorithms.
5. Introduces pattern matching algorithms

Course Outcomes:

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

1. Explain the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.
2. Discuss hashing and different collision resolve techniques.
3. Design programs using a varietyof data structures including binarysearch trees, heaps trees and AVL-trees.
4. Design programs on sorting and graphs.
5. Applydifferent searching techniques on Non linear data structure

UNIT–I **[10 Lectures]**

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT–II **[6 Lectures]**

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT–III **[8 Lectures]**

Search Trees: Binary Search Trees, Definition, Implementation, Operations-Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations–Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT–IV **[8 Lectures]**

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT–V [8 Lectures]

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer – Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXTBOOKS:

1. E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*. Fundamentals of Data Structures in C, 2nd Edition,2008.
2. A. S. Tanenbaum, Y. Langsam, and M. J.Augenstein,PHI/Pearson Education. Data Structures using C ,2004.

REFERENCE BOOKS:

1. R. F. Gilberg and B.A. Forouzan, Cengage *Learning.* Data Structures: A Pseudocode Approach with C, 2nd Edition,2016.

Web Links:

1. https://nptel.ac.in/courses/106102064
2. https://www.programiz.com/dsa/data-structure-types
3. https://www.coursera.org/learn/data-structures

Basic Electrical & Electronics Engineering

L T P C

B. Tech. II Semester
Subject Code: 22EC204ES **3 1 0 4**

Prerequisites:

Course Objectives:

1. To introduce the concepts of electrical circuits and its components.
2. To studyand understand the different types of DC, AC single & three phase circuits.
3. To studyand understand the different types of DC, AC machines and Transformers.
4. To introduce the concepts of diodes & transistors.
5. To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

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

1. Identifythe basic DC electrical circuits.
2. Evaluate the basic single phase and three phase AC circuits.
3. Analyze the working principles of Electrical Machines.
4. Classifythe concepts of diodes & Rectifiers.
5. Compare the knowledge of various transistor configurations, characteristics and applications.

UNIT- I: **[14 Lectures]**

D.C. CIRCUITS: Introduction, Types of elements, Definitions, Ohm's law and its limitations, Passive elements R-L-C, Energy sources-Ideal and practical, Series and Parallel combination of Resistances, Inductances and Capacitances, Star-Delta Transformation, Source transformation, Kirchhoff's Laws, Mesh analysis, Nodal analysis.

UNIT-II: **[12 Lectures]**

A.C. CIRCUITS: Representation of sinusoidal waveforms, Instantaneous value, Peak value, Average and RMS value, Form factor and Peak factor for sinewave, Rectifier output, Saw tooth and Square Waveforms, Phasor representation, Real power, Reactive power, Apparent power, Power factor, Analysis of single- phase ac circuits RL, RC, RLC series combination. Three phase balanced circuits, Voltage and current relationship in star and delta connections.

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UNIT – III: **[14 Lectures]**

TRANSFORMERS: Construction, Types, Working principle of Single-phase transformer, EMF equation, Equivalent circuit, Losses in transformers, Efficiency and Condition for maximum efficiency.

DC& AC Machines: Construction, Working Principle of DC generator, EMF equation, Types, Working principle of DC motor, Torque equation, Three phase induction motor construction and working, Slip and Rotor current frequency.

UNIT – IV: **[10 Lectures]**

DIODES: Principle of Operation, Diode current equation, Volt-Ampere characteristics, Static and dynamic resistances, Diffusion and Transition capacitances. Half Wave Rectifier, Full Wave Rectifier-Center-Tap and Bridge Rectifier, Ripple factor, Rectification efficiency, Peak

Inverse Voltage, Transformer Utilisation Factor, Simple problems. Zener diode characteristics, Zener diode as voltage regulator.

UNIT – V: **[10 Lectures]**

Bipolar junction Transistor: Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Current amplification factor, Relation between α and β, Comparison of CE, CB and CC configurations. SCR Construction, Operation and V-I characteristics.

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. V.K. Mehta, Rohit Mehta, Principles of Electrical Engineering and Electronics – S.Chand Publications, 2nd Edition,2014.

REFERENCEBOOKS:

1. R. L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits – PEI/PHI, 9th Ed, 2006.
2. J. Millman and C. C. Halkias, SatyabrataJit, Electronic Devices and Circuits – TMH, 2/e, 1998.
3. William Hayt and Jack E. Kemmerly, Engineering circuit analysis- McGraw Hill Company, 6th edition,2012.
4. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
5. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

Web Links:

1. www.youtube.com/watch?v=vh_aCAHThTQ
2. www.electricaleasy.com/2014/03/electrical-transformer-basic.html
3. www.youtube.com/watch?v=Unh99Qn7CmI
4. www.youtube.com/watch?v=d_LOXUEFA-o
5. www.electricaleasy.com/2022/09/construction-and-working-of-dc-generator.html.

Computer Aided Engineering Graphics

B. Tech. II Semester **L T P C**

Subject Code: 22ME205ES **1 0 2 2**

Pre-requisites: Computer Aided Engineering Graphics course of first year of study.

Course Objectives: To learn

1. To provide basic concepts in engineering drawing. To develop the abilityof visualization of objects through technical drawings
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw projections of solids and pictorial views of solids and to draw surfaces development
   of solid for prisms, pyramids, cone and cylinder.
4. To draw isometric views of solids and orthographic projections of solids.
5. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products.

Course outcomes:

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

1. Applycomputer aided drafting tools to sketch the conventions and the methods of drawings, engineering curves and scales
2. Identifyand draw the projections of points, lines and planes in different types of projections. manually and by using computer aided drafting tools
3. Analyze the need of projections of solids (prisms, pyramids, cone and cylinder) manually and by using computer aided drafting tools.
4. Evaluate and interpret engineering drawings for development of surfaces to Right Regular Solids-prism, manuallyand byusing computer aided drafting tool.
5. Change the conversion of orthographic projection into isometric view and vice versa manually and byusing computer aided drafting tool.

UNIT- I: INTRODUCTION TO ENGINEERING DRAWING [12 Lectures]

Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid. Scales – Plain and Diagonal. Introduction to CAD Software commands and practice.

UNIT -II: ORTHOGRAPHIC PROJECTIONS [12 Lectures]

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. manually and by using computer aided drafting

UNIT –III: PROJECTIONS OF SOLIDS [12 Lectures]

Projections of Regular Solids – Prism, Cylinder, Pyramid and Cone. manually and by using computer aided drafting.

UNIT- IV: DEVELOPMENT OF SURFACE [12 Lectures]

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone. manually and by using computer aided drafting

UNIT –V: ISOMETRIC PROJECTIONS: [12 Lectures]

Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions –Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Conversion of Isometric Views to Orthographic Views and Vice-versa. manually and by using computer aided drafting

Note: - Internal exam and The End Semester Examination will be conducted by using Auto Cad Software.

TEXTBOOKS:

1. N.D. Bhatt / Charotar, Engineering Drawing, Publisher: ***Charotar*** Publishing House · GenreJanuary 2019.
2. T. Jeyapoovan, Vikas: Engineering Drawing and graphics Using AutoCAD Third Edition S. Chand and company Ltd. January 2010.
3. N. S. Parthasarathyand Vela Murali/ Engineering Drawing/Oxford publications. 12th june 2015.
4. K Balaveera Reddyet al –Computer Aided Engineering Drawing, CBS Publishers. 2015.

REFERENCE BOOKS:

1. M. B. Shah, B.C. Rane / Engineering Drawing, Pearson. 2009
2. K Balaveera Reddy et al – Computer Aided Engineering Drawing, CBS Publishers. 2015
3. Basant Agrawal and C M Agrawal, Engineering Drawing, Third Edition McGraw Hil.2019
4. K Balaveera Reddy et al – Computer Aided Engineering Drawing -CBS Publishers. 2015.

WEBLINKS:

1. https://www.youtube.com/watch?v=ANEvQyt3PnU
2. https://www.youtube.com/watch?v=rp3swbAYZJU
3. https://www.youtube.com/watch?v=ga1ud9yQl4I
4. http://www.digimat.in/nptel/courses/video/105104148/L04.html
5. https://engineeringvideolectures.com/course/758

Engineering Chemistry Laboratory

B. Tech. II Semester **L T P C**

Subject Code: 22CH206BS **0 0 2 1**

Pre-requesities : To bring adaptabilityto new developments in engineering chemistrylab and acquire the knowledge in practical skills

Course Objectives:

The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to checkits suitability for drinking purpose.
2. To perform estimations of acids and bases using conductometry and potentiometry methods.
3. To prepare polymers such as Bakelite and nylon-6.6 in the laboratory.
4. Learn skills related to the lubricant properties such as saponification value,surface tension and viscosity of oils.
5. Applythe skills in rate of corrosion to solve engineering problems.

Course Outcomes:After completion of this course, the students will be able to:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Perform methods such as conductometry and potentiometry in order to find out the concentrations or equivalence points of acids and bases.
3. prepare polymers like bakelite and nylon-6.6
4. Estimations of saponification value, surface tension and viscosity of lubricant oils.
5. Find the rate of corrosion of mild steel in various conditions.

List of Experiments:

I. **Volumetric Analysis:** Estimation of Hardness of water byEDTA Complexometry method.

II. **Conductometry:** Estimation of the concentration of anacid by Conductometry.

III. **Potentiometry:** Estimation of the concentration of an acid by Potentiomentry Estimation of the amount of Fe^{+2} by Potentiomentry.

I. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon – 6.6

II. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

III. Corrosion: Determination of rate of corrosion of mild steel in the presenceand absence of inhibitor.

IV. **Virtual lab experiments**

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioningof solar cell and its applications.

REFERENCE BOOKS:

1. B. Ramadevi and P. Aparna, Engineering chemistry Lab manual for by S ChandPublications, New Delhi (2022).
2. Vogel's text book of practical organic chemistry 5th edition.
3. A.I. Vogel, Inorganic Quantitative analysis by ELBS Publications.
4. V.K. Ahluwalia, College Practical Chemistry by Narosa Publications Ltd. New Delhi (2007).

Web Links

1. www.youtube.com/watch?v=FCQ26RQBZLg
2. https://www.youtube.com/watch?v=-GS6uoFf3qQ
3. https://www.youtube.com/watch?v=Y48UgKi33Ps
4. https://www.youtube.com/watch?v=TC1M-XDHfDI

Data Structure Laboratory

B. Tech. II Semester **L T P C**

Subject Code: 22CS207ES **0 0 2 1**

Prerequisites: A Course on "Programming for problem solving".

Course Objectives:

1. It provides an understanding of linear data structures such as stacks and queues.
2. It provides an understanding of non linear data structures like tress and graphs.
3. It provides an understanding of linear and binarysearch algorithms.
4. It provides an understanding of sorting algorithms.

Course Outcomes:

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

1. Implement various linear data structures.
2. Implement various non linear data structures.
3. Compare various searching and sorting algorithms.
4. Abilityto implement trees and graphs traversals.

LIST OF EXPERIMENTS

1. Write a program that uses functions to perform the following operations on single linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on double linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort ii) Selection sort iii) Insertion sort
7. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search ii) Binary search

8. Write a program to implement the tree traversal methods.

9. Write a program to implement the graph traversal methods.

TEXT BOOKS:

1. E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*. Fundamentals of Data Structures in C, 2nd Edition,2008.
2. A. S. Tanenbaum, Y. Langsam, and M. J.Augenstein,PHI/Pearson Education.

Data Structures using C ,2004.

REFERENCE BOOKS:

1. R. F. Gilberg and B.A. Forouzan, Cengage *Learning*. Data Structures: APseudocode Approach with C, 2nd Edition,2016.

WEB LINKS:

1. https://nptel.ac.in/courses/106102064
2. https://www.programiz.com/dsa/data-structure-types
3. https://www.coursera.org/learn/data-structures

Basic Electrical & Electronics Engineering Lab

B.Tech. II Semester **L T P C**
Subject Code 22EC208ES **0 0 2 1**

Prerequisites: Mathematics
Corequisites: Basic Electrical and Electronics Engineering

Course Objectives:

1. To Analyze a given network byapplying various electrical laws.
2. To Analyze the performance of single phase transformers.
3. To Analyze the performance of transformers, DC and AC machines.
4. To introduce the concepts of diodes and transistors.
5. To impart the knowledge of various types of Rectifiers.

Course Outcomes:

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

1. Verifythe Ohms law, KCL, KVL with practical approach.
2. Estimate the performance calculations of single phase transformers.
3. Analyze the Performance characteristics of DC and AC machines through various testing methods.
4. Compare the characteristics of different types of diodes and transistors.
5. Evaluate the performance of Rectifiers with and without filters.

SECTION A: ELECTRICAL ENGINEERING:

1. Verification of Ohm's law.
2. Verification of KCL and KVL.
3. Brake test on DC Shunt motor.
4. Brake test on 3-phase Induction motor.
5. Load Test on Single-Phase Transformer.
6. Measurement of Voltage, Current and Real Power in Primary and Secondary circuits of a Single Phase Transformer.
7. No Load Characteristics of 3 phase Alternator.

SECTION B: ELECTRONICS ENGINEERING:

1. 1. Studyand operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies iv) CRO
2. PN Junction Diode Characteristics A)Forward bias B) Reverse bias
3. Zener Diode CharacteristicsA)Forward bias B) Reverse bias
4. Input and Output characteristics of BJT in CE Configuration.
5. Half wave Rectifier without and with Filters .
6. Full wave Rectifier without and with Filters .
7. Note: Total 10 experiments are to be conducted.

(Minimum Five experiments from PART-A, Five experiments from PART-B)

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata

McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S. Chand, 2 nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.

Web links: -

1. .https://www.youtube.com/watch?v=Ki60DB0I3W4&list=PLwymdQ84KI-x0T05PcG6D_2rhbWV_O93B&index=2
2. https://www.youtube.com/watch?v=W-AqhZLm7h4
3. https://www.youtube.com/watch?v=UkH4CaAsG6Q
4. https://www.youtube.com/watch?v=Hfkd7UFSIF0
5. https://www.youtube.com/watch?v=i9wbWYtm2cI
6. https://www.youtube.com/watch?v=UdaATCmDfYU
7. https://www.youtube.com/watch?v=1IZIjIf3NDw
8. https://www.youtube.com/watch?v=X-i1MevYcpM
9. https://www.youtube.com/watch?v=syZgyPLHyp8
10. https://www.youtube.com/watch?v=QGawHsg4NpQ

Environmental Science

B. Tech. II Semester **L T P C**

Subject Code: 22CH209MC **3 0 0 0**

Prerequisites: None

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

Course Outcomes: After completion of this course, the students will be able to:

1. Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Analyze and synthesize scientific data to characterize and evaluate the status of atleast one type of ecological system and apply skills of measurement, spatial orientation, sampling, and data analysis to characterize natural resource phenomena
3. Create awareness on the basic philosophyof science, concepts and scope.
4. Evaluate consequences of human exposure to pollution and its impacts to environmental quality.
5. Comprehending the statutoryand regulatorymechanisms pertaining to environment in India and understanding judicial response to environmental issues in India.

UNIT-I **[10 Lectures]**

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnifications, ecosystem value, services and carrying capacity, Field visits.

UNIT-II. **[7 Lectures]**

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: useand over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III [**7 Lectures**]

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV [**10 Lectures**]

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of

modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater

Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and MontréalProtocol. NAPCC-GoI Initiatives.

UNIT-V [**8 Lectures**]

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wildlife Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. **EIA:** EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects.Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Footprint, Life Cycle assessment (LCA), Lowcarbon lifestyle.

TEXTBOOKS:

1. Erach Bharucha , Textbook of Environmental Studies for Undergraduate Courses, The Orient Black swan, 2nd edition , 1 January 2015.
2. R. Rajagopalan, Environmental Studies , Oxford UniversityPress,3rd edition, April, 2015

REFERENCE BOOKS:

1. Richard T. Wright, Environmental Science: towards a sustainable future , Benjamin Cummings Pub Co,13th edition, 17 January 2016.
2. Gilbert M. Masters and Wendell P. Ela, Environmental Engineering and science, Pearson, 3rd edition, 15 December 2006.
3. Daniel B. Botkin & Edward A. Keller, Environmental Science , Wiley publishing,8th edition,2012.
4. Anubha Kaushik, Environmental Studies , New age international publishers, 4th Edition, 1 January 2012
5. Dr. M. AnjiReddy, Textbook of Environmental Science and Technology,BS Publications, 31 october 2014.
6. Y. Anjaneyulu , Introduction to Environmental Science , BS.Publications, 1 January 2004

Web links:

1. https://onlinecourses.nptel.ac.in
2. https://archive.nptel.ac.in
3. https://onlinecourses.swayam2.ac.in
4. https://onlinecourses.nptel.ac.in
5. https://onlinecourses.nptel.ac.in

COMPUTER ORIENTED STATISTICAL METHODS

B. Tech. III Semester **L T P C**
3 1 0 4

Subject Code: 22MA301BS
Pre-requisites: Mathematics courses of first year of study.

Pre-requisites: Mathematical Courses of first year of study
Course Objectives: To learn

1. The concept of Probability and Random variables
2. The Probabilitydistributions of discrete and continuous random variables
3. The sampling theory, testing of hypothesis and making statistical inferences.

Course outcomes: After completion of this course, the student will be able to:

1. Applythe concepts of probabilityand Random variables
2. Analyse the concept of Probabilitydistributions to some case studies
3. Formulate and solve problems byapplystatistical methods for analyzing experimental data.
4. Demonstrate the concept of estimation and distinguish regression analysis and to compute and interpret the coefficient of correlation.
5. Examine the given statistical hypothesis

UNIT - I: Probability and Random Variable **10 Lectures**
Review of Probability, Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions. Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables

UNIT-II : Discrete and Continuous Distributions **10 Lectures**
Discrete Probability Distributions: Binomial Distribution, Poisson distribution.Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distributions.

UNIT-III: Sampling Distribution **10 Lectures**
Fundamentals of Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, t - Distribution, F-Distribution and Chi-square Distribution.

UNIT-IV: Estimation, Simple Linear Regression and Correlation **10 Lectures**
Estimation: Point and interval estimations, criteria of good estimator, estimations for means and properties.
Simple Linear Regression and Correlation: Introduction of linear regression, the simple Linear Regression Model, least squares and fitted model, Inferences concerning the regression coefficients, Prediction, Simple Linear regression case study.

UNIT-V: Tests of Hypothesis **10 Lectures**

Statistical Hypothesis: General Concepts, Testing a Statistical Hypothesis, Single sample: Tests concerning a single mean, Two samples: tests on two means, One sample: test on a single proportion. Two samples: tests on two proportions.

Small Sample tests: Student-t-test for single mean, difference of means and F-test for equality of two variances, Chi-Square test for goodness of fit and independence of attributes.

TEXT BOOKS:

1. Dr.T.K.V. Iyengar, B.Krishna Gandhi, S. RanganathamandDr.M.V.S.S.N.Prasad, Probability and statistics , S.Chand, EigthRevisesed edition ,2020.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, S.Chand publications, 12th revised edition ,2020 .
3. S.D.Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi,2014.

REFERENCE BOOKS:

1. Sheldon M Ross, Probabilityand statistics for Engineers and scientists, 6th edition, academic press, 2020.
2. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations, 2015.

WEBLINKS:

1. **https://youtu.be/r1s**
2. **https://youtu.be/enDYkFxJE9W**
3. **https://youtu.be/VVYLpmKRfO8**

Digital Electronics

B.Tech. III Semester	L	T	P	C
	3	0	0	3

Subject Code: 22EC302ES

Pre-requisite: Basic Electrical and Electronics Engineering

Course Objectives:

1. To Compare common forms ofnumber representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
3. To understandthe concepts of combinational logic circuits.
4. To designsequential logiccircuits.
5. To know various memories and logic families.

Course Outcomes: Upon completingthis course, the student will be able to

1. Compare the numerical information in different forms and Boolean Algebra theorems.
2. Applythe various simplification methods to simplify the given Boolean function.
3. Analyze and design various combinational logic circuits.
4. Learn the concepts of sequential circuits.
5. Illustratevarious memories and logic families.

UNIT – I: **[10 Lectures]**

NUMBER SYSTEMS: Number Systems, Number base conversions, Binary, Octal, Decimal, and Hexadecimal Numbers, Complements of Numbers, Binary codes: Weighted and Non weighted codes.

BOOLEAN ALGEBRA: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, Universal Gates.

UNIT – II: **[8 Lectures]**

GATE – LEVEL MINIMIZATION: The map method, Three-variable map, Four-variable map, product of sums simplification and Sum of Products Simplification using K-map, Don't-care conditions, NAND and NOR implementation.

UNIT – III: **[10 Lectures]**

COMBINATIONAL LOGIC: Combinational Circuits, Design procedure, Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, BCD Adder, Magnitude Ccomparator, Decoders, Encoders, Multiplexers, and Demultiplexers.

UNIT – IV: **[8 Lectures]**

SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops, Design Procedure**,** state Reduction and Assignment, Registers, shift Registers, synchronous counters, Asynchronous Counters, Ring Counter, Johnson Counter.

UNIT – V: **[8 Lectures]**

MEMORIES AND LOGIC FAMILIES

Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array, Programmable Array logic. AND, OR and NOT Gates using Diodes, Classification of Integrated circuits, comparison of various logic families.

TEXT BOOKS:

1. M. Morris Mano, Digital Design, 3rd Edition, Pearson Education/PHI, 2021.
2. Albert Paul Malvino Donald P. Leach, Digital Principles and Applications, 2nd Edition, TATA McGraw Hill, 1976.
3. A. Anand Kumar, Pulse and Digital Circuits, 2nd Edition, PHIPublications,2012.

REFERENCE BOOKS:

1. Zvi. Kohavi, Switching and Finite Automata Theory, 3rd Edition,Tata McGraw Hill, 2009.
2. C.V.S. Rao, Switching and Logic Design, 1st Edition, Pearson Education, 2005.
3. Donald D.Givone, Digital Principles and Design, Tata McGraw Hill, Edition, 2017.

WEBLINKS:

1. http://nptel.ac.in/courses/117/106/117106086/ (By Prof. Goutam Saha, Electronics & Electrical Communication Engineering Dept, IIT Kharagpur).
2. www.nptelvideos.in/2012/12/digital-circuits-and-systems.html(By Prof. Santanu
3. Chattopadhyay, Electronics & Electrical Communication Engineering Dept, IIT Kharagpur).
4. https://www.smartzworld.com/notes/switching-theory-and-logic-design-stld/.

PROGRAMMING WITH PYTHON

B. Tech. III Semester **L T P C**
3 0 0 3

Subject Code: 22CY303PC
Prerequisites: Basicknowledge on C Programming**.**

Course Objectives:

1. Learn Syntax and Semantics in Python.
2. Explore the arrays and strings in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Handle Files, Modules, and exceptions in Python.
5. Implement Object Oriented Programming concepts in Python.

Course Outcomes: After completion of this course, the students will be able to:

1. Examine Python syntax and semantics, flow control.
2. Demonstrate proficiencyin handling Strings and Arrays.
3. ApplyPython Programs usingcore data structures like Lists, Dictionaries and use Regular Expressions.
4. Conduct experiments on file handling, exception handling, and modules.
5. Interpret the concepts of Object-Oriented Programming as used in Python.

UNIT - I **[8 Lectures]**

Introduction to Python: History, Features, Applications, First Python Program, Variables, Data Types, Numbers, Operators, Input and Output statements.
Control Statements: Conditional Statements, A Word on Indentation, Looping Statements, the else Suite, break, continue, pass, assert, return.

UNIT – II **[6 Lectures]**

Arrays in Python: Arrays, Types of Arrays, Working with Arrays using numpy, Creating Arrays, Operations on Arrays, Attributes of an Array, The reshape() Method, The flatten() Method, Matrices in numpy, Matrix Addition and Multiplication.
Strings and Characters: Creating Strings, Operations on Strings, Working with Characters, Sorting Strings, Searching Strings.

UNIT – III **[8 Lectures]**

Functions in Python: Defining a Function, Calling a Function, Parameters, Recursive Functions.
List: Creating Lists using range() Function, Operations on Lists, Methods to Process List, Sorting the List Elements.
Tuple: Creating Tuples, Accessing the Tuple Elements, Operations on Tuple, Functions to Process Tuples.
Dictionaries: Operations on Dictionaries, Dictionary Methods, Sorting the Elements of a Dictionary using Lambdas, Converting Lists into Dictionary, Converting Strings into Dictionary, Passing Dictionaries to Functions.

UNIT – IV **[10 Lectures]**

Files in Python: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules.
Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules.
Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

UNIT – V **[8 Lectures]**

OOPS using Python: Classes and Objects, Inheritance and Polymorphism, Abstract Classes and Interfaces.

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

TEXT BOOKS:

1. WesleyJ. Chun, Core Python Programming, Second Edition, Pearson, 2006.
2. R. Nageswara Rao Core Python Programming, Dream Tech Press, 2018.

REFERENCE BOOKS:

1. Reema thareja, Python Programming using problem solving approach, *Oxford University Press*, 2019.
2. Dietel and Dietel, Python How to Program, 2002.

WEB LINKS:

1. https://nptel.ac.in/courses/106106145
2. https://onlinecourses.nptel.ac.in/noc20_cs83/preview
3. https://www.visualpathedu.com/home/course/core-python/1
4. https://www.visualpathedu.com/home/course/advanced-python/3
5. https://www.udemy.com/topic/python/free/
6. https://www.coursera.org/specializations/python

COMPUTER ORGANIZATION AND ARCHITECTURE

B.Tech. III Semester **L T P C**
3 0 0 3

Subject Code: 22CY304PC
Prerequisites: A Course on "Digital Logic Design and Microprocessors".

Course Objectives:
1. Introduce principles of computer organization and the basic architectural concepts.
2. Explore the basic organization, design, and programming of a simple digital computer.
3. Introduces simple register transfer language to specifyvarious computer operations.
4. Describing memoryorganization and I/O systems.
5. Introduce pipelining and vector processing.

Course Outcomes: After completion of this course, the students will be able to:
1. Identityof computer organization architecture.
2. Analyze the basics of instruction sets and their functionality.
3. Evaluate arithmetical operations byusing data.
4. Demonstrate the functional units of the computer.
5. Design a pipeline for consistent execution of instructions.

UNIT–I **[10 Lectures]**

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro-operations, shift micro-operations, Arithmetic logic shift unit.

UNIT–II **[8 Lectures]**

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

UNIT–III **[8 Lectures]**

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, floating – point Arithmetic operations.

UNIT–IV **[6 Lectures]**

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

UNIT–V **[8 Lectures]**

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Cache Coherence.

TEXT BOOKS:

1. M. Moris Mano, Computer System Architecture, *Third Edition, Pearson/PHI, 2016.*
2. William Stallings, Computer Organization and Architecture, *6th ed, Pearson/PHI, 2010.*

REFERENCE BOOKS:

1. Car Hamacher, ZvonksVranesic, SafeaZaky, Computer Organization, Vth Edition, McGraw Hill, 2002.
2. Andrew S.Tanenbaum, Structured Computer Organization, 4th Edition, PHI/Pearson, 2003.
3. B. Ram, Computer Fundamentals Architecture and Organization, 5th ed., New Age International Publications, 2000.

WEB LINKS:

1. https://nptel.ac.in/courses/106105163
2. https://onlinecourses.nptel.ac.in/noc20_cs64/preview
3. https://www.udemy.com/topic/computer-architecture/

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B.Tech. III Semester **L T P C**
3 0 0 3

Subject Code: 22CY305PC

Prerequisites: Basic knowledge on C Programming.**Course Objectives:**

1. To introduce the object-oriented programming concepts.
2. To introduce the implementation of packages and interfaces
3. To introduce the concepts of exception handling and multithreading.
4. To introduce the concepts of collection framework.
5. To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes: After completion of this course, the students will be able to:

1. Solve real world problems using OOP techniques.
2. Applythe packages and interfaces, streams in I/O.
3. Examine development of exceptions, multithreaded applications with synchronization.
4. Analyze the usage of collection framework.
5. Design GUIbased applications using applets and swings.

UNIT–I **[10 Lectures]**

Object-Oriented Thinking-Away of viewing world–Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

UNIT–II **[8 Lectures]**

Packages- Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces-defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Stream based I/O (java.io)–The Stream Classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

UNIT–III **[6 Lectures]**

Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

Multi-threading- Differences between thread-based multitasking and process-based multi-tasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT–IV **[6 Lectures]**

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hash table, Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, `Random`, `Formatter`, `Scanner`

UNIT–V **[10 Lectures]**

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls – Jlabel and Image Icon, JTextField.

The Swing Buttons- JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

TEXT BOOKS:

1. Herbert Schildt, Java The complete reference, 9th edition, *McGraw Hill Education (India) Pvt. Ltd*, 2014.
2. T. Budd, Understanding Object-Oriented Programming with Java, updated edition, *Pearson Education*, 2000.

REFERENCE BOOKS:

1. J. Nino and F.A. Hosch, An Introduction to programming and OO design using Java, *John Wiley & sons*, 2007.
2. Y. Daniel Liang, Introduction to Java programming, *Pearson Education*, 1998.
3. P. Radha Krishna, Object Oriented Programming through Java, *University Press*, 2007.
4. S. Malhotra, S. Chudhary, Programming in Java, 2nd edition, *Oxford University Press*, 2018.
5. R. A. Johnson, An Introduction to Java Programming and Object-oriented Application Development, *Cengage Learning*, 2012.

WEB LINKS:

1. https://nptel.ac.in/courses/106105191
2. https://www.visualpathedu.com/home/course/core-java-training/175
3. https://www.visualpathedu.com/home/course/advanced-java-training/176
4. https://www.coursera.org/specializations/object-oriented-programming
5. https://www.upgrad.com/blog/java-free-online-course/
6. https://www.edx.org/course/java-programming-fundamentals
7. https://education.oracle.com/java/java/pFamily_48

PYTHON LAB

B.Tech. III Semester **L T P C**
0 0 3 1.5

Subject Code: 22CY306PC
Prerequisites: Basic knowledge on C Programming and students should install Python

Co-requisite: A Course on "Programming with Python".

Course Objectives:

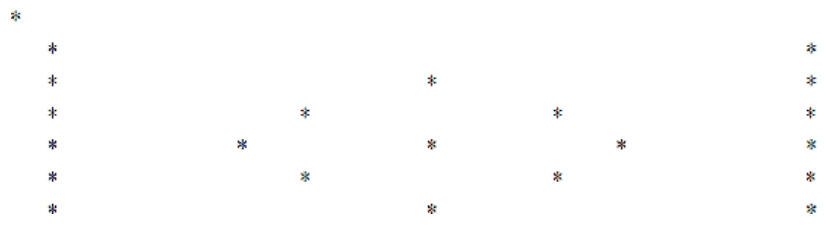
1. To learn basic data types, operators, use of procedural statements like assignments, conditional statements, loops and function calls.
2. To make use of functions and string operations.
3. To work with the data structures like lists, set, dictionaries and tuples in python.
4. To acquire knowledge on object-oriented programming concepts in python.
5. To implement file handling and error handling mechanisms.

Course Outcomes: After completion of this course, the students will be able to:

1. Practice the basic concepts of python programming.
2. Applyfunctions to design modular programming and perform string operations.
3. Analyze various data structures like lists, set, dictionaries and tuples in python.
4. Implement object-oriented programming concepts using python.
5. Build applications using file handling and error handling techniques.

List of Programs:

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST2017"
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula: c/5 = f-32/9]
10. Write a Python program to construct the following pattern, using a nested for loop



11. Write a Python script that prints prime numbers less than20.
12. Write a python program to find factorial of a number using Recursion.
13. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
15. Write a python program to define a module and import a specific function in that module to another program.
16. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
17. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
18. Write a Python class to convert an integer to a roman numeral.
19. Write a Python class to implement pow (x,n)
20. Write a Python class to reverse a string word byword.

TEXT BOOKS:

1. WesleyJ. Chun, Core Python Programming, Second Edition, Pearson, 2006.
2. R. Nageswara Rao Core Python Programming, Dream Tech Press, 2018.

REFERENCE BOOKS:

1. Python Programming using problem solving approach, Reema thareja, Oxford University Press, 2019.
2. Dietel and Dietel, Python How to Program, 2002.

WEB LINKS:

1. https://nptel.ac.in/courses/106106145
2. https://onlinecourses.nptel.ac.in/noc20_cs83/preview
3. https://www.visualpathedu.com/home/course/core-python/1
4. https://www.visualpathedu.com/home/course/advanced-python/3
5. https://www.udemy.com/topic/python/free/
6. https://www.coursera.org/specializations/python

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

B.Tech. III Semester. **L T P C**
0 0 3 1.5

Subject Code: 22CY307PC
Prerequisites: Basic knowledge on C Programming.

Co-requisite: A Course on "OOPS Through Java".

Course Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using the java collection framework.
3. To writemultithreaded programs.
4. To write GUI programs using swing controls in Java.
5. To introduce java compiler and eclipse platform.

Course Outcomes: After completion of this course, the students will be able to:

1. Write programs for solving real world problems using the java collection framework.
2. Write programs using abstract classes.
3. Write multithreaded programs.
4. Write GUIprograms using swing controls in Java.
5. Impart hands-on experience with java programming.

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the useof the Eclipse platform.

2. The list suggests the minimum program set. Hence, the concerned staff is requested to addmore problems to the list as needed.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project,add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for thedigits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

3. A) Develop an applet in Java that displays a simple message.
B) Develop an applet in Java that receives an integer in one text field, and computes its factorialValue and returns it in another text field, when the button named "Compute" is clicked.

4. Write a Java program that creates a user interface to perform integer divisions. The user enters twonumbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Resultfield when the Divide button is clicked. If Num1 or Num2 were not an

integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Displaythe exception in a message dialog box.

5. Write a Java program that implements a multi-thread application that has three threads. First threadgenerates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

6. Write a Java program for the following:Create a doubly linked list of elements.Delete a given element from the above list. Displaythe contents of the list after deletion.

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in the selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle suchthat each one of the classes extends the class Shape. Each one of the classes contains onlythe methodprint Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, andthe remaining lines correspond to rows in the table. The elements are separated by commas.
Write a java program to displaythe table using Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of thewindow when a mouse event is fired (Use Adapter classes).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint:use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using theconcept of inter thread communication.

13. Write a Java program to list all the files in a directoryincluding the files present in all itssubdirectories.

TEXT BOOKS:

1. P. J. Deitel and H. M. Deitel Java for Programmers, 10th Edition *Pearson education.*
2. Bruce Eckel, Thinking in Java, *Pearson Education.*
3. D. S. Malik and P. S. Nair, Java Programming, *Cengage Learning*.
4. CayS. Horstmann and G Cornell, Core Java, *Volume 1, 9th edition, Pearson.*

REFERENCE BOOKS:

1. J. Nino and F.A. Hosch, An Introduction to programmingand OO design using Java, John Wiley & sons, 2007.
2. Y. Daniel Liang, Introduction to Java programming, Pearson Education, 1998.
3. S. Malhotra, S. Chudhary, Programming in Java, 2nd edition, Oxford UniversityPress, 2018.
4. R. A. Johnson, An Introduction to Java Programming and Object-oriented Application Development, Cengage Learning, 2012.

WEB LINKS:

1. https://nptel.ac.in/courses/106105191
2. https://www.visualpathedu.com/home/course/core-java-training/175
3. https://www.visualpathedu.com/home/course/advanced-java-training/176
4. https://www.coursera.org/specializations/object-oriented-programming
5. https://www.upgrad.com/blog/java-free-online-course/
6. https://www.edx.org/course/java-programming-fundamentals
7. https://education.oracle.com/java/java/pFamily_48

DATA VISUALIZATION - R PROGRAMMING/POWER BI

B.Tech. III Semester

L	T	P	C
0	0	2	1

Subject Code: 22CY308PC

Course Objectives:

1. Effective use of Business Intelligence (BI) technology(Tableau) to applydata visualization
2. To discern patterns and relationships in the data.
3. To build Dashboard applications.
4. To communicate the results clearlyand concisely.
5. To be able to work with different formats of data sets.

Course Outcomes: After completion of this course, the students will be able to:

1. Understand How to import data into Tableau.
2. Understand Tableau concepts of Dimensions and Measures.
3. Develop Programs and understand how to map Visual Layouts and Graphical Properties.
4. Create a Dashboard that links multiple visualizations.
5. Use graphical user interfaces to create Frames for providing solutions to real world problems.

Lab Problems:

1. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations,Creating Your First visualization?

2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau,creating basic charts (line, bar charts, Tree maps), Using the Show me panel.

3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculationsand fields.

4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Toolsand Menus, Formatting specific parts of the view.

5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.

6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.

7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels,customizingfilters, Using and Customizing tooltips, Formatting your data with colors.

8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for differentdisplays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.

9. Tableau file types, publishingto Tableau Online, Sharing your visualizations, printing, and Exporting.

10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

REFERENCE BOOKS:

1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science byRoger D. Peng (References)
3. The Art of R Programming byNorman Matloff Cengage Learning India.

GENDER SENSITIZATION LAB

B. Tech. III Semester **L T P C**
0 0 2 0

Subject Code: 22EN309MC

Course Objectives:

1. To provide a critical perspective on the socialization of men and women.
2. To help students reflect criticallyon gender violence.

Course Outcomes: After completion of this course, the students will be able to:

1. Men and women students and professionals will be better equipped to work and live together as equals.
2. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the empower students to understand and respond to gender violence.

UNIT - I
UNDERSTANDING GENDER
Gender: WhyShould We Study It? (Towards a World of Equals: Unit -1)
Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT - II
GENDER AND BIOLOGY:
Missing Women: Sex Selection and Its Consequences (Towards a World of Equals: Unit -4) Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination.

UNIT - III
GENDER AND LABOUR
Housework: The Invisible Labour (Towards a World of Equals: Unit -3) "My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics (Towards a World of Equals: Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT-IV
ISSUES OF VIOLENCE
Sexual Harassment: Say No! (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".
Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place?
-When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice. Thinking about Sexual Violence (Towards a World of Equals: Unit -11) Blaming the Victim- "I Fought for my Life…."-Additional Reading: The Caste Face of Violence.

UNIT - V
GENDER: CO - EXISTENCE
Just Relationships: Being Together as Equals (Towards a World of Equals: Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

TEXTBOOK

1. A Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, DeepaSreenivas and Susie Tharu, "Towards a World of Equals: A Bilingual Textbook on Gender", published by Telugu Akademi, Hyderabad, Telangana State in the year 2015.

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

REFERENCE BOOKS:

1. Menon, Nivedita, Seeing like a Feminist, New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila, "I Fought For My Life…and Won." Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

WEB LINK:

1. https://nptel.ac.in/courses/110105080

DISCRETE MATHEMATICS

B. Tech. IV Semester. **L T P C**
3 0 0 3

Subject Code: 22CY401PC
Prerequisites: An understanding of Mathematics in general is sufficient**.**

Course Objectives:
1. To understand and construct precise mathematical proofs.
2. To use logic and set theoryto formulate precise statements.
3. To analyze and solve counting problems on finite and discrete structures.
4. To describe methods of counting and able to solve recurrence relations.
5. To apply graph theoryin solving computing problems.

Course Outcomes: After completion of this course, the students will be able to:
1. Construct precise mathematical proofs.
2. Use logic and set theoryto formulate precise statements.
3. Analyze and solve counting problems on finite and discrete structures.
4. Solve counting problems and recurrence relations.
5. Apply graph theoryin solving computing problems.

UNIT - I
Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT - II
Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

UNIT - III
Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as PartiallyOrdered Sets, Boolean Algebra.

UNIT - IV
Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

UNIT - V
Graph Theory: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits,Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

TEXT BOOKS:
1. P. Tremblay, R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, *McGraw-Hill, 1st ed.*
2. Joe l. Mott, Abraham Kandel,Teodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, *Prentis Hall of India, 2nd ed.*

REFERENCE BOOKS:

1. Ralph.P. Grimald, Discrete and Combinatorial Mathematics - an applied introduction, *Pearsoneducation, 5th edition.*
2. Thomas Kosy, Discrete Mathematical Structures, *Tata McGraw Hill publishing co.*

COMPUTER NETWORKS

B.Tech. IV Semester

L	T	P	C
3	0	0	3

Subject Code: 22CY402PC

Pre-requisites:

1. A course on "Programming for problem solving".
2. A course on "Data Structures".

Course Objectives

1. Understanding the fundamental concepts of computer networks.
2. Exploringthe functionalities of layered models.
3. Design the rooting algorithm in a network.
4. Abilityto know services of transpose layer.
5. Explore the knowledge of computer networks applications.

Course Outcomes: After completion of this course, the students will be able to:

1. Gain the knowledge of the basic computer network technology.
2. To know the functionalities of each layer in the OSI and TCP/IP reference model.
3. Implementation of subnetting and routing mechanisms.
4. Describe the essential transport protocols.
5. Understanding the applications of computer networks.

UNIT – I **[10 Lectures]**

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET,Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, WirelessTransmission.

Data link layer: Design issues, framing, Error detection and correction.

UNIT – II **[10 Lectures]**

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-freechannel, A simplex stop and wait protocol for noisy channels.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocolusing Selective Repeat, Example data link protocols.

Medium Access sublayer: The channel allocation problem, Multiple access protocols: ALOHA, Carriersense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT – III **[8 Lectures]**

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing,Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT – IV **[6 Lectures]**

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCPand UDP protocols.

UNIT – V **[8 Lectures]**

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:

1. Andrew S Tanenbaum, David. j. Wetherall, Computer Networks -- 5th Edition. PearsonEducation/PHI

REFERENCE BOOKS:

1. S. Keshav, An Engineering Approach to Computer Networks- 2nd Edition, Pearson Education
2. Behrouz A. Forouzan, Data Communications and Networking –Third Edition TMH.

WEB LINKS:

1. https://onlinecourses.swayam2.ac.in/cec23_cs07/preview
2. https://onlinecourses.nptel.ac.in/noc23_cs48/preview
3. https://onlinecourses.nptel.ac.in/noc23_cs35/preview

OPERATINGSYSTEMS

B.Tech. IV Semester

L	T	P	C
3	0	0	3

Subject Code: 22CY403PC

Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Computer Organization and Architecture".

Course Objectives:

1. Introduce the OS concepts, their services and process concepts.
2. Describe the CPU scheduling algorithms and deadlocks.
3. Understand the process communication and management systems.
4. Design the memorymanagement systems.
5. Understand the file system and its operations

Course Outcomes: After completion of this course, the students will be able to:

1. Demonstrate the basic concepts of Operating Systems.4
2. Implement various process scheduling algorithms and deadlock techniques.
3. Examine various and process management concepts.
4. Applymemorymanagement strategies and page replacement algorithms.
5. Analyze file management and disk management aspects of operating systems.

UNIT – I **[10 Lectures]**

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT – II **[10 Lectures]**

CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recoveryfrom Deadlock

UNIT – III **[8 Lectures]**

Process Management and Synchronization - The Critical Section Problem, SynchronizationHardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors **Interprocess Communication Mechanisms:** IPC between processes on a single computer system,IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT – IV **[6 Lectures]**

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT – V **[6 Lectures]**

File System Interface and Operations -Access methods, Directory Structure, Protection, File SystemStructure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Operating System Principles, 7th Edition, John Wiley, 2006.
2. W. R. Stevens, Advanced programming in the UNIX environment, Pearson education, 1992.

REFERENCE BOOKS:

1. O Stallings, Operating Systems – Internals and Design Principles, Fifth Edition, Pearson Education/PHI, 2005.
2. Crowley, Operating System A Design-oriented Approach, TMH, 1996.
3. Andrew S. Tanenbaum, Modern Operating Systems, 2nd edition, Pearson/PHI, 1992.
4. Kernighan and Pike, UNIX programming environment, PHI/Pearson Education, 1983.
5. U. Vahalia, UNIX Internals -The New Frontiers, Pearson Education, 1995.

WEB LINKS:

1. https://nptel.ac.in/courses/106105214
2. https://onlinecourses.nptel.ac.in/noc21_cs88/preview
3. https://www.coursera.org/specializations/codio-introduction-operating-systems
4. https://www.coursera.org/learn/os-power-user
5. https://www.codecademy.com/learn/fundamentals-of-operating-systems
6. https://www.nesoacademy.org/cs/03-operating-system

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. IV Semester

L	T	P	C
3	0	0	3

Subject Code: 22MB404HS
Prerequisites: None

Course Objective:

1. Understand the basic Business types, the impact of the Economy Businesses and Firms specifically.
2. Learn the market demand and supply.
3. Analyze the Business from the Financial Perspective.
4. Preparing account statements and balance sheets.
5. Analyze the fund flow and cash flows.

Course Outcome: After completion of this course, the students will be able to:

1. Understand the various Forms of Business and the impact of economic variables on the Business.
2. Comprehend the demand and supplyanalysis.
3. Explore the usage of marketing and pricing of a product.
4. Maintaining the financial accounts of a firm or company.
5. Monitoring the accounts through ratios.

Unit – I: Introduction to Business and Economics

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply and Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinarynature of Business Economics.

UNIT - II: Demand and Supply Analysis

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function and Law of Supply.

UNIT - III: Production, Cost, Market Structures & Pricing

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition. **Pricing:** Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT - IV: Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts(Simple Problems).

UNIT - V: Financial Ratios Analysis: Concept of Ratio Analysis, Importance and Types of Ratios, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (simple problems).

TEXT BOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, InternationalBook House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, VikasPublications, 2013.

SOFTWARE ENGINEERING

B.Tech. IV Semester **L T P C**
3 0 0 3

Subject Code: 22CY405PC
Prerequisites: Familiarity with at least one computer programming language.

Course Objectives:
1. Understanding the end-user requirements.
2. Build system models based on the requirements.
3. Design architectural process.
4. Strategic approach for testing methodologies.
5. Understanding software qualitymanagement.

Course Outcomes: After completion of this course, the students will be able to:
1. Make use of the software development life cycle principles and process models.
2. Construct the software requirements specifications with relevant use-cases.
3. Analyze the project management strategies and various components to build the architecture using suitable design strategies.
4. Estimate the best coding standards and testing strategies to develop high quality software products.
5. Design metrics for process and products with the help of risk and qualitymanagement.

UNIT – I **[10 Lectures]**
Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. **A Generic view of process**: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). **Process models**: The waterfall model, Spiral model and Agile methodology

UNIT – II **[8 Lectures]**
Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT – III **[6 Lectures]**
Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns,architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequencediagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT – IV **[6 Lectures]**
Testing Strategies: A strategic approach to software testing, test strategies for conventional software,black-box and white-box testing, validation testing, system testing, the art of debugging.
Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT – V **[8 Lectures]**
Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 qualitystandards.

TEXT BOOKS:

1. Roger S. Pressman, Software Engineering, A practitioner's Approach, 6th edition, Mc Graw Hill International Edition, 2015.
2. Sommerville, Software Engineering, 7th edition, Pearson Education, 2004.
3. Grady Booch, James Rambaugh, Ivar Jacobson, The unified modeling language user guide, Pearson Education, 1999.

REFERENCE BOOKS:

1. James F. Peters, Witold Pedrycz, Software Engineering: an Engineering approach, John Wiley, 2000.
2. Waman S Jawadekar, Software Engineering principles and practice, The Mc Graw-Hill Companies, 2004.
3. Meilerpage-Jones, Fundamentals of object-oriented design using UML, Pearson Education, 2000.

WEB LINKS:

1. https://nptel.ac.in/courses/106105182
2. https://www.coursera.org/learn/introduction-to-software-engineering
3. https://www.coursera.org/specializations/software-engineering
4. https://www.edx.org/course/software-engineering-introduction

COMPUTER NETWORKS LAB

B.Tech. IV Semester

L	T	P	C
0	0	2	1

Subject Code: 22CY406PC

Prerequisites:

1. Familiaritywith Programming for Problem Solving and data structures

Co-requisites: Course on "Programming for Problem Solving".

Course Objectives:

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology andobserve its performance
3. To analyze the traffic flow and the contents of protocol frames

Course Outcomes: After completion of this course, student will be able to:

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

List of Experiments:

1. Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control usingthe sliding window protocol,and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting techniques used in buffers.
10. **Wireshark**
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate & Throughput.
    vi. Simulate to Plot Congestion for Different Source/Destination
    vii. Simulate to Determine the Performance with respect to Transmission of Packets

TEXT BOOKS:

1. Andrew S Tanenbaum, David. j. Wetherall, Computer Networks, 5th Edition. PearsonEducation/PHI

REFERENCE BOOKS:

1. S.Keshav, An Engineering Approach to Computer Networks, 2nd Edition, Pearson Education
2. Behrouz A. Forouzan, Data Communications and Networking –. 3rd Edition, TMH.

WEB LINKS:

1. https://onlinecourses.swayam2.ac.in/cec23_cs07/preview
2. https://onlinecourses.nptel.ac.in/noc23_cs48/preview
3. https://onlinecourses.nptel.ac.in/noc23_cs35/preview

OPERATING SYSTEMS LAB

B.Tech. IV Semester

L	T	P	C
0	0	2	1

Subject Code: 22CY407PC

Prerequisites:

1. A course on "Programming for Problem Solving".
2. A course on "Computer Organization and Architecture".

Co-requisite: A course on "Operating Systems".

Course Objectives:

1. To understand design aspects of operating system concepts through simulation.
2. To Introduce basic Unix commands, system call interface for process management.

Course Outcomes: After completion of this course, student will be able to:

1. Examine different operating system concepts.
2. Develop C programs using Unix system call.
3. Illustrate the following IPC mechanisms
4. Simulate Page Replacement Algorithms.
5. Demonstrate Deadlock management.

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) RoundRobin d) priority

2. Writeprograms usingthe I/O system calls of UNIX/LINUX operating system (open, read, write, close,fcntl, seek, stat, opendir, readdir)

3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

4. Write a C program to implement the Producer – Consumer problem using semaphores usingUNIX/LINUX system calls.

5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory

6. Write C programs to simulate the following memorymanagement techniques a) Paging b)Segmentation

7. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, John Wiley, Operating System Principles-7th Edition,
2. W.R.Stevens ,Advanced programming in the Unix environment, Pearson education 3rd Edition 2013.

REFERENCE BOOKS:

1. William Stallings, Operating Systems – Internals and Design Principles, Pearson Education/PHI, Fifth Edition–2005.
2. Crowley, Operating System - A Design Approach, TMH. 1996
3. Andrew S Tanenbaum, Modern Operating Systems, Pearson/PHI, 2nd edition.
4. Kernighan and Pike, UNIX Programming Environment, PHI/Pearson Education 2016
5. U. Vahalia, UNIX Operating System: The New Frontiers, Pearson Education 2006

Web Link:

1. https://nptel.ac.in/courses/106108101
2. https://www.nptel.ac.in/courses/106/105/1061052

NODE JS/ REACT JS/ DJANGO

B. Tech. IV Semester **L T P C**
0 0 2 1

Subject Code: 22CY408PC
Prerequisites: Object Oriented Programming through Java, HTML Basics

Course Objectives:

1. To implement the static web pages using HTML and do client-side validation using JavaScript.
2. To design and work with databases using Java
3. To develop an end-to-end application using java full stack.
4. To introduce Node JS implementation for server-side programming.
5. To experiment with single page application development using React.

Course Outcomes: After completion of this course, student will be able to:

1. Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
2. Demonstrate Advanced features of JavaScript and learn about JDBC
3. Develop Server – side implementation using Java technologies like
4. Develop the server – side implementation using Node JS.
5. Design a Single Page Application using React.

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 andexperiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java stand-alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed inexperiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of anyuser is veryimportant. Explore the various sessiontracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS,path, event.
10. Develop an express web application that can interact with REST API to perform CRUDoperations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation usingchart.js
14. Create a TODO application in react with necessary components and deploy it into github.

REFERENCE BOOKS:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, KathySierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2ndEdition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo,Express, React, and Node, 2nd Edition, A Press.

CONSTITUTION OF INDIA

B.Tech. IV Semester **L T P C**
3 0 0 0

Subject Code: 22EN410MC

Course Objectives:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rightsperspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolutionin 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: After completion of this course, student will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before thearrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed theconceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
4. Discuss the passage of the Hindu Code Bill of 1956.

UNIT - 1 Historyof Making of the Indian Constitution- Historyof Drafting Committee.

UNIT - 2 Philosophyof the Indian Constitution- Preamble Salient Features

UNIT - 3 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powersand Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj:Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

NETWORK SECURITY AND CRYPTOGRAPHY

B. Tech. V Semester **L T P C**
3 1 0 4

Subjects Code: 22CY501PC

Pre-requisites: A course on "Computer Networks"

Course Objectives:

1. To introduce various cryptographic algorithms and their characteristics.
2. To describe the private and public-key cryptosystems.
3. To know the key management scenarios.
4. To explore enhancements of Web security and Firewalls made to IPv4 by IPSec.
5. To understand the PGP key pair and use the PGP package to send an encrypted e-mail message.

Course Outcomes: After completion of this course, the students will be able to:

1. Analyse the key concepts of cryptography and security.
2. Comprehend the private and public key cryptographic algorithms.
3. Define the key distribution and management methods.
4. Use of transporting data by Web security and Firewalls protocols.
5. Distribute the PGP to send a secured e-mail message.

UNIT – I **[10 Lectures]**

Security Concepts: Introduction, Need for Security, Security Approaches, Principles of Security, Types of Security Attacks, Security Services, Security Mechanisms, A Model for Network Security.

Cryptography Concepts and Techniques: Introduction, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks.

UNIT – II **[11 Lectures]**

Symmetric Key Ciphers: Block Cipher Principles, DES, AES, Blowfish, RC5, IDEA, Block Cipher Operation, Stream Ciphers, RC4.

Asymmetric Key Ciphers: Principles of Public Key Cryptosystems, RSA Algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT – III **[10 Lectures]**

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message Authentication Codes: Authentication Requirements, HMAC, CMAC, Digital Signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution using Symmetric and Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public Key Infrastructure.

UNIT – IV **[9 Lectures]**

Transport Level Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH).

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security.

UNIT – V **[8 Lectures]**

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange.

Case Studies on Cryptography and Security: Secure Multiparty Calculation, Virtual Elections, Single Sign, Secure Inter-Branch Payment Transactions, Cross-Site Scripting Vulnerability.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

WEB LINKS:

1. https://onlinecourses.nptel.ac.in/noc21_cs16/preview
2. https://www.coursera.org/courses?query=cryptography
3. https://www.udemy.com/topic/cryptography/
4. https://www.classcentral.com/course/swayam-cryptography-and-network-security-9896
5. https://www.nesoacademy.org/cs/11-cryptography-and-network-security

DATABASE MANAGEMENT SYSTEMS

B. Tech. V Semester **L T P C**
3 0 0 3

Subjects Code: 22CY502PC

Pre-Requisites:
1. A Course on "Data Structures".

Course Objectives:
1. Understand the basic concepts and the applications of database systems.
2. Introducing relational databases.
3. Basics of SQL and construct queries using SQL.
4. Topics include transaction control and concurrency control.
5. Understand storage structures and access techniques.

Course Outcomes: After the completion of the course the student can able to
1. Analyze the logical design concepts of the database.
2. Design the physical model of a database and its operations.
3. Apply the knowledge of SQL to construct the queries for efficient data access and manipulation.
4. Implement transaction processing and concurrency control.
5. Examine different indexing mechanisms and database storage access.

UNIT – I **[10 Lectures]**

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

UNIT – II **[8 Lectures]**

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT – III **[10 Lectures]**

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, Fifth normal form.

UNIT – IV **[8 Lectures]**

Transaction: Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT – V **[8 Lectures]**

Data on External Storage: File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM),

B+ Trees: A Dynamic Index Structure

TEXT BOOKS:

1. Raghurama Krishnan,Johannes Gehrke, Database Management Systems, Tata Mc GrawHill 3rd Edition, 2002.
2. Silberschatz, Korth, Database System Concepts, McGrawhill, V edition, 1980.

REFERENCE BOOKS:

1. Peter Rob & Carlos Corone, Database Systems design, Implementation, and Management, l7th Edition, 1993.
2. Elmasri Navrate, Fundamentals of Database Systems, Pearson Education, 2011.
3. C.J. Date, An Introduction to Database Systems, Pearson Education, 2004.
4. S. Shah and V. Shah, Oracle for Professionals, The XTeam, SPD, 2008.
5. Shah, Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, PHI, 2004.
6. M. L. Gillenson, Fundamentals of Database Management Systems, WileyStudent Edition, 2011.

WEBLINKS:

1. https://nptel.ac.in/courses/106105175
2. https://onlinecourses.nptel.ac.in/noc21_cs04/preview
3. https://onlinecourses.nptel.ac.in/noc22_cs91/preview
4. https://www.visualpathedu.com/home/course/oracle-database-development/113
5. https://www.mygreatlearning.com/database-management-system/free-courses
6. https://www.coursera.org/learn/database-management
7. https://www.coursera.org/learn/sql-practical-introduction-for-querying-databases

FORMAL LANGUAGES AND AUTOMATA THEORY

B. Tech. V Semester **L T P C**
3 0 0 3

Subjects Code: 22CY503PC

Pre-requisites: Foundations of Logic, Set Theory, Graph Theory, Automata Theory.

Course Objectives

1. To provide an introduction to some of the central ideas of theoretical computer science from theperspective of formal languages.
2. To introduce the fundamental concepts of formal languages, grammar, and automata theory.
3. Employ finite-state machines to solve problems in computing.
4. To understand deterministic and non-deterministic machines.
5. To understand the differences between decidability and undesirability.

Course Outcomes

1. Understand the concept of abstract machines and their power to recognize languages.
2. Understand the fundamental concepts of formal languages, grammar, and automata theory
3. Employ finite-state machines for modeling and solving computing problems.
4. Design context-free grammars for formal languages.
5. Distinguish between decidability and undesirability.

UNIT – I **[12 Lectures]**

Introduction to Finite Automata: Structural Representations-Formal Definition, Finite Automata Model, Types of Finite Automata, Automata and Complexity, Transition Diagram and Transition Table, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

Nondeterministic Finite Automata: Formal Definition of NFA-Graphical Representation of NFA, Eliminating & Transitions, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA-Graphical Representation of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Mealy machines.

UNIT – II **[10Lecture]**

Regular Expressions: Finite Automata and Regular Expressions-Operations of Regular Expression-Examples of Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions, Arden's Theorem.

Pumping Lemma for Regular Languages, Statement of the pumping Lemma, Applications of the Pumping Lemma, Checks if the language is context-free or not, Context Sensitive Grammar(CSG) and Language(CSL).

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT – III **[8 Lectures]**

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar-Derivation tree, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Trees, Applications of Context-Free Grammars, Ambiguity in Grammars and Unambiguous Grammar Languages.

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalenceof PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

UNIT – IV **[8 Lectures]**

Normal Forms for Context-Free Grammars: Eliminating useless symbols, Eliminating €-Productions. Chomsky's Normal form(CNF), Greibach Normal Form(GNF), Conversion of Chomsky's Normal form(CNF) to Greibach Normal Form(GNF).

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications.

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties ofCFL's.

Turing Machines: Introduction to Turing Machine, Formal Description, Basic Model of Turing Machine, Instantaneous description,The language of a Turing machine

UNIT – V **[12 Lectures]**

Types of Turing machines: Turing machines and halting

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Propertiesof recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines, Applications of Different Automata.

TEXT BOOKS:

1. John E. Hopcroft,Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, 3rd Edition, Pearson Education.
2. Mishra and Chandrashekaran, Theory of Computer Science – Automata languages and computation, 2nd edition, PHI.
3. C.K Nagpal, Formal Languages and Automata Theory-- Oxford; Illustrated edition (7 April 2011).

REFERENCE BOOKS:

1. John C Martin, Introduction to Languages and The Theory of Computation, TMH.
2. Daniel I.A. Cohen, Introduction to Computer Theory, John Wiley.
3. P. K. Srimani, Nasir S. F. B, A Textbook on Automata Theory, Cambridge University Press.

4. Michael Sipser, Introduction to the Theory of Computation, 3rd edition, Cengage Learning.
5. Kamala Krithivasan,Rama R, Introduction to Formal Languages Automata Theory and Computation Pearson.

WEB LINKS:

1. https://www.javatpoint.com/automata-basic-model-of-turing-machine
2. https://www.geeksforgeeks.org/introduction-of-finite-automata/
3. https://www.tutorialspoint.com/automata_theory/pumping_lemma_for_regular_grammar.htm

COMPILER DESIGN (Professional Elective –I)

B. Tech. V Semester

L	T	P	C
3	0	0	3

Subject Code: 22CY511PE

Pre-requisites

1. A course on "Formal Languages and Automata Theory".
2. A course on "Computer Organization and architecture".
3. A course on "Data Structures".

Course Objectives:

1. Introduce the major concepts of language translation and compiler design and impart the
2. Knowledge of practical skills necessary for constructing a compiler.
3. Topics include phases of a compiler, parsing, syntax-directed translation, type-checking use of symbol tables, code optimization techniques, intermediate code generation, code generation, and data flow analysis.
4. To understand code optimization to improve the performance of a program in terms of space and time complexity.
5. To understand Design algorithms to generate machine code.

Course Outcomes:

1. Compute tokens and regular expressions for lexical analysis.
2. Implement top-down and bottom-up parsers.
3. Construct intermediate code for procedures.
4. Optimize the code generation.
5. Design algorithms to generate machine code and analyze the data flow.

UNIT – I **[10 Lectures]**

Introduction: The structure of a compiler, the science of building a compiler, and programming language basics.

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT – II **[8 Lectures]**

Syntax Analysis: Introduction, Context-Free Grammars, writing a Grammar, Role of Parser-Error Handling- Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators, Introduction to LALR Parser, Construction of SLR Parsing.

UNIT – III **[10 Lectures]**

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for Syntax Directed Definition(SDD's), Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-AttributedSDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT – IV **[12 Lectures]**

Run-Time Environments: Storage Organization**,** Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in theTarget Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation

UNIT – V **[8 Lectures]**

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination,Loops in Flow Graphs.

TEXT BOOK:

1. Compilers: Principles, Techniques, and Tools, Second Edition, Alfred Aho, Monica Lam, Ravi Sethi, Jeffrey D. Ullman, January 2013. ISBN-978-9332518667.
2. Modern Compiler Implementation in Java. Andrew W Appel, Jens Paisberg. Cambridge University Press, January 2002. ISBN-978-0521820608
3. Modern Compiler Implementation in ML, Andrew W Appel, Cambridge University Press, December 1997. ISBN-0 521 58274 1 (hardback) ISBN 0521582741
4. Compiler Construction: Principles and Practice, 1st Edition, Kenneth C. Louden, Cengage Learning; 1 edition (January 24, 1997), ISBN-13: 978-0534939724

REFERENCE BOOKS:

1. Compilers: Principles, Techniques, & Tools, 2/E By Aho · 2008.
2. COMPILER DESIGN (WITH CD) Paperback – 23 November 2012 by NA (Author, Contributor.

WEB LINKS:

1. https://www.youtube.com/watch?v=5ZmFlxrNaN8&list=PLBlnK6fEyqRjT3oJxFXRgjPNzeS-LFY-q
2. https://www.javatpoint.com/compiler-tutorial
3. https://www.academia.edu/36474260/LECTURE_NOTES_ON_COMPILER_DESIGN_III_B_Tech_I_semester_JNTUH_R13_COMPUTER_SCIENCE_AND_ENGINEERING
4. https://www.youtube.com/watch?v=OQCjakjCJu4&list=PLmXKhU9FNesSmu-_DKC7APRoFkaQvGurx
5. https://www.youtube.com/watch?v=yxnbvS2t_QA&list=PLbMVogVj5nJQNjkHZgwuAlfQ9tzmQDxjA

ARTIFICIAL INTELLIGENCE (Professional Elective –I)

B. Tech. V Semester **L T P C**
3 0 0 3

Subjects Code: 22CY512PE
Pre-requisites:
1. A course on "Data Structures, Probability".

Course Objectives:
1. To learn the distinction between optimal reasoning vs. human-like reasoning.
2. To know the concepts of state space representation, exhaustive search, and heuristic search.
3. To search together with the time and space complexities.
4. To learn different knowledge representation techniques.
5. To know the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcomes:
1. Formulate an efficient problem space for a problem expressed in natural language.
2. Define the search algorithm for problem-solving and estimate the performance analysis.
3. Apply knowledge using the appropriate technique for a given problem.
4. Build AI techniques to solve problems of game playing and machine learning.
5. Formulate uncertain problem-solving using probability.

UNIT – I **[10 Lectures]**
Introduction to AI: Intelligent Agents, Problem-Solving Agents, searching for Solutions, Uninformed Search Strategies: Breadth-First Search, Uniform Cost Search, Depth-First Search, Iterative Deepening Depth-First Search, Bidirectional Search, Informed (Heuristic) Search Strategies: Greedy Best-First Search, A* Search, Heuristic Functions, Beyond Classical Search: Hill-Climbing Search, Simulated Annealing Search, Local Search in Continuous Spaces

UNIT – II **[10 Lectures]**
Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions. Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPS, Local Search for CSPS, and Structure of Problems.
Propositional Logic: Knowledge-Based Agents, Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and Proofs, Proof by Resolution, Horn Clauses and Definite Clauses, Forward and Backward Chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT – III **[8 Lectures]**
First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.
Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

UNIT – IV **[8 Lectures]**

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, Other Classical Planning Approaches, Analysis of Planning Approaches.

UNIT – V **[10 Lectures]**

Uncertain Knowledge and Learning Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference using Full Joint Distributions, Independence, Bayes' Rule and Uses **Probabilistic Reasoning:** Representing Knowledge in an Uncertain Domain, Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning, Dempster-Shafer Theory.

TEXT BOOK:

1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henry Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education

WEBLINKS:

1. https://www.geeksforgeeks.org/difference-between-business-intelligence-and-data-warehouse/
2. https://onlinecourses.nptel.ac.in/noc24_cs65/preview

DATA WAREHOUSING AND DATA MINING (Professional Elective – I)

B. Tech. V Semester **L T P C**
3 0 0 3

Subjects Code: 22CY513PE

Pre-Requisites:

1. Database Management System
2. Probability and Statistics

Course Objectives:

1. Students will become acquainted with both the strengths and limitations of various data mining techniques like Association, Classification, Cluster, and Outlier analysis. Understand Data warehouse and OLAP tools and architectures.
2. To understand the data warehouse models, architectures, and schemas for enterprise applications.
3. To understand the Perform market basket analysis using association rule mining.
4. Understanding various classification models.
5. To learn the appropriate clustering and outlier detection techniques to handle complex data.

Course Outcomes:

1. Understand the need for data mining and pre-processing techniques.
2. Identify data warehouse models, architectures, and schemas for enterprise applications.
3. Perform market basket analysis using association rule mining.
4. Understanding various classification models.
5. Identify appropriate clustering and outlier detection techniques to handle complex data.

UNIT - I

Introduction to Data Mining: **[12 Lectures]**

Need of Data mining, Kinds of Data, Knowledge Discovery process, Data Mining Functionalities-Kinds of Patterns mined, Major Issues in Data Mining. Data Pre-processing**:** Descriptive Data summarization, Data Cleaning, Data Integration & Transformation, Data Reduction, Data Discretization.

UNIT- II

Data Warehouse and OLAP: **[10 Lectures]**

Data Warehouse basic concepts- Differences between Operational Database Systems and Data Warehouses, A Multidimensional Data model- Stars, Snowflakes, and Fact Constellations, Examples for Defining Star, Snowflake, and Fact Constellation Schemas, Measures: Their Categorization and Computation, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model, A Starnet Query Model for Querying Multidimensional Databases.,

Data warehouse architecture- Design and Construction of Data Warehouses, A Three-Tier Data Warehouse Architecture, Data Warehouse Back-End Tools and Utilities, Metadata Repository, Types of OLAP Servers: ROLAP versus MOLAP versus HOLAP.

UNIT- III **[10 Lectures]**

Mining frequent patterns, associations and correlations: Basic Concepts, Market Basket Analysis, Frequent Itemsets, Closed Itemsets, and Association Rules, Apriori Algorithm, FP-growth, mining various kinds of association rules- Mining Multilevel Association Rules, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Analysis to Correlation Analysis- Strong Rules Are Not Necessarily Interesting: An Example, From Association Analysis to Correlation Analysis.

UNIT- IV **[10 Lectures]**

Classification and prediction: Basic Concepts, issues regarding classification and prediction- Preparing the Data for Classification and Prediction, Comparing Classification and Prediction Methods. Decision Tree Induction, Bayesian Classification, Rule-Based Classification, classification by backpropagation- A Multilayer Feed-Forward Neural Network, Defining a Network Topology, Backpropagation lazy learners- k-Nearest-Neighbor Classifiers, Case-Based Reasoning, Inside the Black Box: Backpropagation and Interpretability.

Prediction: linear regression, nonlinear regression, evaluating the accuracy of a classifier or predictor

UNIT- V **[8 Lectures]**

Cluster Analysis: Requirements for Cluster Analysis, Overview of Basic Clustering Methods, Partitioning Methods-k-Means, k-Medoids, Hierarchical Methods-AGENES, DIANA, BIRCH, Density- Based Method-DBSCAN: A Density-Based Clustering Method Based on Connected Regions with Sufficiently High Density,

Outlier Analysis- Statistical Distribution-Based Outlier Detection, Distance-Based Outlier Detection, Density-Based Local Outlier Detection, Deviation-Based Outlier Detection

TEXT BOOKS:

1. Jiawei Han, Micheline Kamber, Jian Pei., Data Mining: Concepts and Techniques, 2nd/3rd Edition, Morgan Kaufmann/Elsevier, 2012.
2. Margaret H Dunham., Data Mining Introductory and Advanced Topics, 2nd Edition, PearsonEducation India, 2006.

REFERENCE BOOKS:

1. Arun K Pujari, Data Mining Techniques, 3rd Edition, Universities Press.
2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, and Vipin Kumar., Introduction to DataMining, 2nd Edition, Pearson Education India, 2021.
3. Amitesh Sinha., Data Warehousing, Thomson Learning, India, 2007.

Web Links

1. https://mitmecsept.files.wordpress.com/2017/04/data-mining-concepts-and-techniques-2nd-edition-impressao.pdf
2. https://theswissbay.ch/pdf/Gentoomen%20Library/Data%20Mining/Dunham%20-%20Data%20Mining.pdf

AD HOC & SENSOR NETWORKS (Professional Elective – I)

B. Tech. V Semester **L T P C**
3 0 0 3

Subjects Code: 22CY514PE

Pre-requisites
1. Computer Networks, Distributed Systems
2. Mobile Computing

Course Objectives
1. To understand the challenges of routing in ad-hoc and sensor networks
2. To understand various broadcast, multicast, and geocasting protocols in ad hoc and sensornetworks.
3. To understand the basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN.
4. To understand the basics of Wireless Sensors Applications and the Classification of Sensor Networks.
5. To understand the basics of the Transport layer and the dynamic nature of WSNs.

Course Outcomes
1. Understand the concepts of sensor networks and applications.
2. Understand and compare the MAC and routing protocols for ad-hoc networks.
3. Understand the transport protocols of sensor networks.
4. Understanding basics of Wireless Sensors Applications and Classification of sensor networks.
5. Understanding the basics of the Transport layer and the dynamic nature of WSNs.

UNIT – I **[12 Lectures]**

Introduction to Ad hoc Networks: Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms- Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; Position- based routing algorithms- Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies, Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT – II **[10 Lectures]**

Data Transmission: Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area- based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP.

Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

UNIT – III **[10 Lectures]**

Geocasting: Data-transmission Oriented-LBM; Voronoi Diagram Based Geocasting, Route Creation Oriented-GeoTORA, MGR**.** TCP over Ad Hoc TCP protocol overview: TCP Basics, TCP Header Format, Congestion Control.

TCP and MANETs: MANETs, Effects of Partition on TCP, Impact of Lower Layers On TCP, MAC Layer Impact, DSR, TORA, Solutions for TCP over Ad hoc:

UNIT – IV **[10 Lectures]**

Basics of Wireless Sensors and Lower Layer Issues: Introduction, Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer. Network Structure Based: Flat Routing, Directed Diffusion, Sequential Assignment Routing (SAR), Hierarchical Routing, Cluster Based Routing Protocol (CBRP).

UNIT – V **[8 Lectures]**

Upper Layer Issues of WSN: Transport layer, High-level application layer support: Distributed Query Processing, Sensor Databases, Distributed Algorithms, Adapting to the inherent dynamic nature of WSNs: In-Network Processing, Sensor Networks, and mobile robots: Sensors for Mobile Robots, Different sensors, Classifying sensors.

TEXT BOOKS

1. Carlos Corderio Dharma P.Aggarwal, Ad Hoc and Sensor Networks – Theory and Applications, World Scientific Publications, March 2006, ISBN – 981-256- 681-3
2. Feng Zhao, Leonidas Guibas, Wireless Sensor Networks: An Information Processing Approach, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

REFERENCE BOOKS:

1. C. Siva Ram Murthy, B.S. Manoj Ad Hoc Wireless Networks: Architectures and Protocols.
2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols andApplications, Wiley.
3. AdHoc and Sensor Networks –Theory and Applications, Carlos Cordeiro Dharma P.Aggarwal, World Scientific Publications, March 2006, ISBN–981– 256–681–3.
4. Wireless Sensor Networks: AnInformation Processing Approach, FengZhao, Leonid as Guibas, ElsevierScience, ISBN –978-1-55860-914-3 (Morgan Kauffman).

WEB LINKS:

1. https://youtu.be/ycaz99NogS4?si=9LV2dJXwvTcINz6a
2. https://youtu.be/IwE-FegRjls?si=lkBebTYnUTtYjGlR

CLOUD COMPUTING (Professional Elective – I)

B. Tech. V Semester **L T P C**
3 0 0 3

Subjects Code: 22CY515PE

Pre-requisites: Courses on Computer Networks, Operating Systems, Distributed Systems.

Course Objectives:

1. Understand different computing paradigms and the potential of the paradigms specifically cloud computing
2. Understand cloud service types, cloud deployment models, and technologies supporting and driving the cloud
3. Programming models for the cloud and development of software applications that run the cloud and various services available from major cloud providers
4. Understand the security concerns and issues in cloud computing
5. Understand the advances in cloud computing.

Course Outcomes:

1. Acquire the knowledge different computing paradigms and the potential of the paradigms specifically cloud computing
2. Able to understand cloud service types, cloud deployment models, and technologies supporting and driving the cloud
3. Acquire the knowledge of programming models for the cloud and development of software applications that run the cloud and various services available from major cloud providers
4. Able to understand the security concerns and issues in cloud computing
5. Acquire the knowledge of advances in cloud computing.

UNIT – I **[12 Lectures]**

Computing Paradigms, Cloud Computing Fundamentals: Motivation for Cloud Computing, Defining Cloud Computing, Principles of Cloud computing, Cloud Ecosystem, Requirements for Cloud Services, Cloud Application, Benefits and Drawbacks, Cloud Computing Architecture and Management.

UNIT – II **[10 Lectures]**

Cloud Deployment Models: Private Cloud, Public Cloud, Community Cloud, Hybrid Cloud.
Cloud Service Models- Infrastructure as a Service. Platform as a Service, Software as a Service, and Other Cloud Service Models.
Technological Drivers for Cloud Computing: SOA and Cloud, Multicore Technology, Web 2.0 and Web 3.0, Pervasive Computing, Operating System, and Application Environment.

UNIT – III **[10 Lectures]**

Virtualization: Introduction, Virtualization Opportunities, Approaches to Virtualization, Hypervisors, From Virtualization to Cloud Computing.
Programming Models for Cloud Computing: Introduction, MapReduce, Cloud Haskell, Software Development in Cloud: Introduction, Different Perspectives on SaaS Development, New Challenges, Cloud-Aware Software Development Using PaaS Technology.

UNIT – IV **[10 Lectures]**

Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers- Availability, Poor Network Performance, Security, Transport Layer Issues in DCNs- TCP Impairments in DCNs.

Cloud Service Providers: Introduction, EMC, Google, Amazon Web Services, Microsoft, IBM, SAP Labs, Salesforce, Rackspace, VMware, Manjrasoft.

UNIT – V **[8 Lectures]**

Security in Cloud Computing: Introduction- Cloud in Information Technology, Cloud General Challenges, Security Aspects- Data Security, Virtualization Security, Network Security, Platform-Related Security- Security Issues in Cloud Service Models, Software-as-a-Service Security Issues, Platform-as-a-Service Security Issues, Infrastructure-as-a-Service Security Issues, Audit and Compliance- Disaster Recovery, Privacy and Integrity.

Advanced Concepts in Cloud Computing: Intercloud, Cloud Management, Mobile Cloud, Media Cloud, Interoperability and Standards, Cloud Governance, Computational Intelligence in Cloud, Green Cloud, and Cloud Analytics.

TEXT BOOK:

1. Chandrasekaran, K. Essentials of cloud computing. CRC Press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

WEBLINKS:

1. https://api.pageplace.de/preview/DT0400.9781482205442_A24097357/preview-9781482205442_A24097357.pdf
2. https://archive.nptel.ac.in/courses/106/105/106105167/
3. https://www.youtube.com/playlist?list=PLDW872573QAbcpQ7VSUdcm4o3tgnQYBE8

ETHICAL HACKING (Professional Elective – II)

B. Tech. V Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY521PE

Pre-requisites:

1. A course on "Operating Systems"
2. A course on "Computer Networks"
3. A course on "Network Security and Cryptography"

Course Objectives:

1. To introduce the methodologies and framework of ethical hacking for enhancing security.
2. The course Includes-Impacts of Hacking; Types of Hackers; Information Security Models;
3. Information Security Program; Business Perspective; Planning a Controlled Attack.
4. Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation)
5. Framework of Steps (Deliverable and Integration)

Course Outcomes:

1. Gain knowledge of the use and availability of tools to support an ethical hack
2. Gain the knowledge of interpreting the results of a controlled attack
3. Understand the role of politics, inherent and imposed limitations, and metrics for planning atest
4. Gain the knowledge of Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation)
5. Gain the knowledge of Framework of Steps (Deliverable and Integration)

UNIT- I **[12 Lectures]**

Introduction: Hacking Impacts, Security Industry Reports, Notable Facts, The Hacker-Type of Hacker-Script Kiddies-Hackers-Uber Hacker, The Hacker Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration

Information Security Models: Computer Security-Harden a System-Physically Secure It-Installing the Operating System-Get It Running-Set System Policies-Accessing the System-Cleanup, Network Security-Transmission Security-Protocol Security-Routing Protocol Security-Network Access Controls, Service Security, Application Security, Security Architecture-Resource Layer-Control-Perimeter-Extended.

Information Security Program: The Process of Information Security-Identify Risk-Quantify Risk-Handling Risk, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking

UNIT – II **[10 Lectures]**

The Business Perspective: Business Objectives, Security Policy, Previous Test Results-Building a Roadmap, Business Challenges-Security Drivers-Increasing Network Complexity-Ensuring Corporate Value-Lower Management Investment-Business Consolidation-Mobile Workforce-Government Regulations and Standards, Business Challenges Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, timing is Everything, Attack Type, Source Point, Required Knowledge-Timing of Information-Internet-Web Authenticated-Application Services-Direct Access, Multi-Phased Attacks-Parallel shared-Parallel Isolated-Series Shared-Series Isolated-Value of Multi-Phase Testing-Employing Multi Phased Tests, Teaming and Attack Structure-Red Team-White Team-Blue Team, Engagement Planner, The Right Security Consultant-Technologies-Architects-Ethics, The Tester, Logistics, Intermediates, Law Enforcement

UNIT – III **[10 Lectures]**

Preparing for a Hack: Technical Preparation-Attacking System-Operating System-Tools-Data Management and Protection-Attacking Network, Managing the Engagement Reconnaissance: Social Engineering-E-Mail-Helpdesk Fraud-Prowling and Surfing-Internal Relations and Collaboration-Corporate Relations and Collaboration, Physical Security-Observation-Dumpster Diving-War driving and War chalking-Theft, Internet Reconnaissance-General Information-Web Sites-Newsgroups-Technical Reconnaissance-Ping Sweeps-Scans-Passive Scan-Active Scan-Interactive Scan

UNIT – IV **[10 Lectures]**

Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase

Exploitation: Intuitive Testing, Evasion, Threads and Groups, Operating Systems-Windows-UNIX, Password Crackers, Rootkits, applications-Web Applications-Distributed Applications-Customer Applications, Wardialing, Network-Perimeter-Network Nodes, Services and Areas of Concern-Services-Services Started by Default-Windows Ports-Null Connection-Remote Procedure Calls (RPC)-Simple Network Management Protocol (SNMP)-Berkeley Internet Name Domain (BIND)-Common Gateway Interface (CGI)-Clear text Services-Network File System (NFS)-Domain Name Service (DNS)-File and Directory Permissions-FTP and Telnet-Internet Control Message Protocol (ICMP)-IMAP and POP-Network Architecture.

UNIT – V **[8 Lectures]**

Deliverable: The Deliverable-Final Analysis-Potential Analysis, The Document, Overall Structure, Aligning Findings, Presentation Findings-Planning and Operations-Vulnerability Ranking-Process Mapping-Recommendations-Exceptions and Limitations-Final Analysis-Conclusion, Overall Structure, Aligning Findings-Technical Measurement-Severity-Exposure, Business Measurement-Cost-Risk, Presentation-Remedial-Tactical-Strategic

Integration: Integrating the Results, Integration Summary, Mitigation-Test-Pilot-Implement-Validate, Defense Planning-Architecture Review-Awareness Training, IncidentManagement, Security Policy, Conclusion.

TEXT BOOK:

1. James S. Tiller, “The Ethical Hack: A Framework for Business Value Penetration Testing”,Auerbach Publications, CRC Press.

REFERENCE BOOKS:

1. EC-Council, "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning.
2. Michael Simpson, Kent Backman, James Corley, "Hands-On Ethical Hacking and NetworkDefense", Cengage Learning.

WEBLINKS:

1. https://www.youtube.com/watch?v=XLvPpirlmEs
2. https://www.youtube.com/watch?v=cMOWZkYVleg
3. https://www.youtube.com/watch?v=FzZ5ykie3yY
4. https://www.geeksforgeeks.org/cyber-security-types-of-enumeration/
5. https://www.sciencedirect.com/science/article/pii/S2667345223000238

INTRODUCTION TO DATA SCIENCE (Professional Elective – II)

B. Tech. V Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY522PE

Pre-requisites:
1. A Course on "Mathematical and Statistical Foundations".
2. A Course on "Data Structures."

Course Objectives:
1. To learn concepts, techniques, and tools that deal with various facets of data science practice, including data collection and integration
2. To understand the basic types of data and basic statistics
3. To demonstrate the use of vectors, matrices, factors, Data frames, and Lists
4. To learn about iterative programming in R
5. To identify the importance of data visualization techniques

Course Outcomes: After the completion of the course the student will be able to:
1. Discuss a flow process for data science problems.
2. Identify types of data and basic Statistical Description.
3. Create vectors, matrices, and lists using R
4. Develop R codes using iterative programming
5. Correlate results to the solution approach

UNIT - I **[10 Lectures]**

Introduction: Definition of Data Science, Big Data and Data Science hype, Datafication, Current Landscape of Perspectives, Statistical Inference, Populations and Samples, Statistical Modeling, Probability Distributions, Fitting a Model, Fitting.

Basics of R: Introduction, R-Environment Setup, Programming with R, Basic Data Types.

UNIT - II **[10 Lectures]**

Types of Data: Attribute, Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attributes, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete vs. Continuous Attributes.

Basic Statistical Descriptions of Data: Measuring the Central Tendency, Mean, Median, and Mode, Measuring the Dispersion of Data, Range, Quartiles, Variance, Standard Deviation, and Interquartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT - III **[9 Lectures]**

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector Sub Setting.

Matrices: Creating and Naming Matrices, Matrix Sub Setting, Arrays, Class.

Factors and Data Frames: Introduction to Factors, Factor Levels, summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, Sub Setting of Data Frames, Extending Data Frames, Sorting Data Frames.

Lists: Introduction, creating a List, creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors.

UNIT- IV **[9 Lectures]**

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements.

Iterative Programming in R: Introduction, While Loop, For Loop, Looping over List.

Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R.

UNIT- V **[9 Lectures]**

Plotting and Visualization: A Brief Matplotlib API Primer, Figures and Subplots, Colors, Markers, Line Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File, Plotting Functions in Pandas, Line Plots, Bar Plots, Histograms and Density Plots, Scatter Plots.

Regression: Linear Regression Analysis, Multiple Linear Regression.

TEXT BOOKS:

1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014.
2. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed. The Morgan Kaufmann Series in Data Management Systems.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education.
3. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
4. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
5. Paul Teetor, "R Cookbook", O'Reilly, 2011.

WEBLINKS:

1. https://www.geeksforgeeks.org/introduction-to-data-science/
2. https://onlinecourses.nptel.ac.in/noc24_cs54/preview

DISTRIBUTED SYSTEMS (Professional Elective – II)

B. Tech. V Semester **L T P C**
3 0 0 3

Subjects Code: 22CY523PE

Pre-requisites:
1. A course on "Operating Systems"
2. A course on "Computer Organization &Architecture"

Course Objectives:
1. To provide an insight into Distributed systems.
2. To introduce concepts related to Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory.
3. To Understand the Time, Global States and Distributed mutual exclusion.
4. To Understand the Fault-tolerant services and Design and Implementation issues.
5. To Understand the Memory Management System

Course Outcomes:
1. Understand Transactions and Concurrency control.
2. Understand distributed shared memory.
3. Design a protocol for a given distributed application.
4. Understand the Time, Global States, and Distributed mutual exclusion.
5. Understand the Fault-tolerant services and Design and Implementation issues.

UNIT-I **[12 Lectures]**

Characterization of Distributed Systems: Examples of Distributed systems, Resources sharing, and web challenges.

System models: Architectural and Fundamental models, Networking and Internetworking, Inter-process Communication.

Distributed objects and Remote: Invocation, Communication between distributed objects, RPC, Events and notifications, Case study- Java RMI.

UNIT-II **[10 Lectures]**

Operating System Support: OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture.

Distributed File Systems: Introduction, File Service architecture.

UNIT-III **[8 Lectures]**

Peer-to-Peer Systems: Napster and its legacy, Peer to Peer middleware

Time and Global States: Introduction, Clocks, events, and Process states, synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.

Coordination and Agreement: Distributed mutual exclusion, Elections, Multicast communication, consensus, and related problems.

UNIT-IV **[10 Lectures]**

Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Time stamp ordering.

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions

Distributed deadlocks: Transaction recovery.

UNIT-V **[8 Lectures]**

Replication: Introduction, System model and group communication, Fault-tolerant services, Transactions with replicated data.

Distributed shared memory: Design and Implementation issues, Consistency models.

TEXTBOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kind berg, Fourth Edition, Pearson Education.
2. S. Ghosh, Chapman & Hall/CRC, Distributed Systems, Taylor & Francis Group,2010.

REFERENCEBOOKS:

1. A.S. Tanenbaum and M.V. Steen, Distributed Systems–Principles and Paradigms, Pearson Education.
2. Ajay D. K shemakalyani and Mukesh Singhal, Distributed Computing, Principles, Algorithms and Systems, Cambridge, rp 2010.

WEBLINKS:

1. https://www.youtube.com/watch?v=cjV4QWYElE0
2. https://www.youtube.com/watch?v=wiBWIdV8Eec
3. https://www.youtube.com/watch?v=7FMTEmyyXHY
4. https://ocw.tudelft.nl/course-readings/2-2-5-replication-in-distributed-systems/
5. https://www.uio.no/studier/emner/matnat/ifi/INF5040/h10/lectures/SystemModels.pdf

CYBER LAWS (Professional Elective – II)

B. Tech. V Semester **L T P C**
3 0 0 3

Subjects Code: 22CY524PE

Pre-requisites: NILL

Course Objectives:

1. Gain an understanding of the evolution and jurisprudence of cyber law in India, including the ITAct2000.
2. Learn about digital signatures, e-governance, and their legal implication sunder the ITAct.
3. Understand the legal framework for electronic contracts, their formation, and international perspectives.
4. Explore taxation issues in cyberspace, cybercrimes, electronic evidence, and their adjudication under the IT Act.
5. Understand the Cybercrime and procedure to report Cybercrime.

Course Outcomes

1. Learn the evolution and key aspects of Indian cyber law, including recent amendments.
2. Gain knowledge about the legalities of digital signatures and the role of e-governance in the ITAct.
3. Developanunderstandingofthelegalitiesinvolvedinelectroniccontractsandinternationalconventions.
4. Adapt in understanding and analyzing cybercrime, electronic evidence, and intellectual property rights in the context of IT.
5. Understanding the Cybercrime and procedure to report Cybercrime.

UNIT-I **[10 Lectures]**

Introduction: History of Internet and World Wide Web, need for cyber law, Cybercrime on the rise, Important terms related to cyber law.
Cyber law in India: Need for cyber law in India, History of cyber law in India.
InformationTechnologyAct,2000: Overview of other laws amended by the IT Act, 2000, National Policy on InformationTechnology2012.

UNIT-II **[12 Lectures]**

Overview of the Information Technology Act, 2000: Applicability of the Act, Important provisions of the Act: Digital signature and Electronic signature, Digital Signature under the IT Act, 2000, E-Governance Attribution, Acknowledgement and Dispatch of Electronic Records, Certifying Authorities, Electronic Signature Certificates, Duties of Subscribers, Penalties and Offences, Intermediaries.

UNIT-III **[8 Lectures]**

Overview of rules issued under The IT Act, 2000, Electronic Commerce, Electronic Contracts, Cyber Crimes, Cyber Frauds.

UNIT-IV **[8 Lectures]**

Regulatory Authorities: Department of Electronics and Information Technology, Controller of Certifying Authorities (CCA), Cyber Appellate Tribunal, Indian Computer Emergency Response Team(ICERT), Cloud Computing, Case Laws.

UNIT-V **[8 Lectures]**

Introduction to Cybercrime and procedure to report Cybercrime: procedure to report cyber-crime, some basic rules for safe operations of the computer and internet, the criminal law (amendment) act,2013: legislative remedies for online harassment and cyber stalking in India.

TEXTBOOKS:

1. PavanDuggal, Textbook on "CyberLaw", second edition, Universal LawPublishing.
2. Pavan Duggal, Textbook on "Indian Cyber law on Cybercrimes",

REFERENCEBOOKS:

1. Debby Russell and Sr.G.TGangemi, "Computer Security Basics (Paperback)", 2nd Edition, O'ReillyMedia,2006.
2. Thomas R. Peltier, "InformationSecurity policies and procedures: APractitioner's Reference", 2ndEditionPrenticeHall,2004.
3. Kenneth J. Knapp, "CyberSecurityand Global InformationAssurance: Threat Analysis andResponseSolutions", IGIGlobal,2009.
4. Thomas R Peltier, Justin Peltier, and John Blackley," Information Security Fundamentals", 2nd Edition, PrenticeHall, 1996.

WEBLINKS:

1. https://www.youtube.com/watch?v=KtuCsBlJXk8
2. https://www.youtube.com/watch?v=cQYACLLAPOw
3. https://www.youtube.com/watch?v=1ZooU-qAScg
4. https://www.pwc.com/id/en/pwc-publications/services-publications/legal-publications/a-comparison-of-cybersecurity-regulations/india.html
5. https://blog.ipleaders.in/cyber-stalking/

IoT SECURITY (Professional Elective – II)

B. Tech. V Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY525PE

Pre-requisites: NILL

Course Objectives:

1. Understand the various attacks and the importance of Security aspects in IoT
2. Understand the techniques, protocols, and security of Gaming models
3. Understand the security and privacy challenges of IoT
4. Understand the application of block chain technology for IoT Security.
5. Understand the crypto currency

Course Outcomes:

1. Incorporate the best practices learned to identify the attacks and mitigate the same
2. Adopt the right security techniques and protocols during the design of IoT products
3. Assimilate and apply the skills learned on ciphers and block chains when appropriate
4. Describe the essential components of IoT
5. Find appropriate security/privacy solutions for IoT
6. Understanding the crypto currency

UNIT- I **[12 Lectures]**

Fundamentals of IoT and Security: Fundamentals of IoT and Security and its need, Prevent Unauthorized Access to Sensor Data, Block ciphers, Introduction to Blockchain, Introduction of IoT devices, IoT Security Requirements, M2M Security, Message integrity Modeling faults and adversaries Difference among IoT devices, computers, and embedded devices.

UNIT- II **[10 Lectures]**

IoT and cyber-physical systems RFID Security: Authenticated encryption Byzantine Generals problemsensors and actuators in IoT, IoT security (vulnerabilities, attacks, and countermeasures), Cyber-Physical Object Security, Hash functions Consensus algorithms and their scalability problems Accelerometer, photo resistor, buttons.

UNIT- III **[10 Lectures]**

Security engineering for IoT development Hardware Security: Merkle trees and Elliptic curves digital signatures, verifiable random functions, Zero-knowledge systems motor, LED, vibrator, IoT security lifecycle, Front-end System Privacy Protection, Management, Secure IoT Databases, Public-key crypto (PKI), blockchain, the challenges, and solutions, analog signal vs. digital signal.

UNIT- IV **[10 Lectures]**

Data Privacy Networking: Function Security Trees signature algorithms proof of work, Proof of stake, Networking in IoT Device/User Authentication in IoT, IoT Networking Protocols, Crypto-currencies, alternatives to Bitcoin consensus, Bitcoin scripting language and their use Real-time communication.

UNIT- V **[8 Lectures]**

Introduction to Authentication Techniques: Secure IoT Lower Layers, Bitcoin P2P network, Ethereum and Smart Contracts, Bandwidth efficiency, Data Trustworthiness in IoT, Secure IoT Higher Layers, Distributed consensus, Smart Contract Languages and verification challenges, Data analytics in IoT - simple data analyzing methods.

TEXT BOOKS:

1. B. Russell and D. Van Duren, "Practical Internet of Things Security," Packt Publishing, 2016.
2. FeiHU, "Security and Privacy Internet of Things(IoTs): Models, Algorithms andImplementations", CRC Press, 2016
3. Narayanan et al., "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction,"Princeton University Press, 2016.

REFERENCE BOOKS:

1. A. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Crypto currencies," O'Reilly, 2014.
2. T. Alpcan and T. Basar, "Network Security: A Decision and Game-theoretic Approach,"Cambridge University Press, 2011.
3. Security and the IoT ecosystem, KPMG International, 2015.
4. Internet of Things: IoT Governance, Privacy, and Security Issues" European Research Cluster.
5. Ollie Whitehouse, "Security of Things: An Implementers' Guide to Cyber-Security for Internetof Things Devices and Beyond", NCC Group, 2014.
6. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guide to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.

WEBLINKS

1. https://www.youtube.com/watch?v=-n72Hau23lM&list=PLBhOIfqz1QTYNe392M0XinoLnd1R3A8wA
2. https://www.youtube.com/watch?v=VhtFv6TtWBo
3. https://www.youtube.com/watch?v=xwgecIX3E4I&list=PLbRMhDVUMngfulSvKL0cT-tn8ULtERsWk
4. https://www.fortinet.com/resources/cyberglossary/what-is-network-security
5. https://www.techtarget.com/iotagenda/feature/How-to-use-IoT-authentication-and-authorization-for-security

NETWORK SECURITY AND CRYPTOGRAPHY LAB

B. Tech. V Semester **L T P C**
0 0 2 1

Subjects Code: 22CY504PC

Corequisite: A Course on "Cryptography and Network Security".

Prerequisites:
1. A Course on "C Programming".
2. A Course on "Java Programming".

Course Objectives:
1. To learn different cipher techniques.
2. To introduce the algorithms DES, RSA, MD5, and SHA-1.
3. To know network security tools and vulnerability assessment tools.
4. To explore key exchange concepts.
5. To understand block cipher implementation.

Course Outcomes: After the completion of the course the student can able to:
1. Develop code for classical Encryption Techniques to solve the problems.
2. Build cryptosystems by applying symmetric and public key encryption algorithms.
3. Construct code for authentication algorithms.
4. Design key exchange mechanisms for secure communication.
5. Implement the network security system using open-source tools.

List of Experiments:
1. Write a C program that contains a string (char pointer) with the value 'Hello world'. The program should XOR each character in this string with 0 and display the result.
2. Write a C program that contains a string (char pointer) with the value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
   a) Ceaser cipher b) Substitution cipher c) Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your key using the Java key tool.
7. Write a Java program to implement the RSA algorithm.
8. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
9. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
10. Calculate the message digest of a text using the MD5 algorithm in JAVA.

TEXT BOOKS:
1. Michael Gregg, Build Your Security Lab: A Field Guide For Network Testing, Wiley India, 2012.
2. Gohel Hardik, Introduction to Network & Cyber Security, LAP Lambert Academic Publishing, 2015.

REFERENCE BOOKS:

1. Neal Krawetz, Introduction to Network Security, CENGAGE Learning, 2007.
2. Bernard Menezes, Network Security and Cryptography, CENGAGE Learning, 1st Edition, 2010.

WEB LINKS:

1. https://cse29-iiith.vlabs.ac.in/
2. https://www.udemy.com/course/building-a-computer-network-test-lab/
3. https://github.com/topics/cns-lab
4. https://github.com/sobolevn/awesome-cryptography

DATABASE MANAGEMENT SYSTEMS LAB

B. Tech. V Semester **L T P C**
0 0 2 1

Subjects Code: 22CY505PC

Co-requisites:

Co-requisite of course "Database Management Systems"

Course Objectives:

1. To Introduce ER data model, database design and normalization.
2. To Learn SQL basics for data definition and data manipulation.
3. To introduce various procedures in SQL.
4. To practice different triggers in SQL.
5. To introduce cursors in SQL

Course Outcomes:

1. Demonstrate the database design using ER Diagrams.
2. Develop SQL Queries to manipulate the data in the database.
3. Apply Procedural Language constructs to execute a block of SQL statements.
4. Design various triggers for different data using SQL.
5. Implement cursors using SQL.

List of Experiments:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints, etc.)
   B. Nested, Correlated subqueries
7. Queries using Aggregate functions, GROUP BY, HAVING, and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:

1. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata Mc GrawHill 3rd Edition, 2002.
2. Silberschatz, Korth, Database System Concepts, McGrawhill, V edition, 1980..

REFERENCES BOOKS:

1. Peter Rob & Carlos Corone, Database Systems design, Implementation, and Management, l7th Edition, 1993.
2. Elmasri Navrate, Fundamentals of Database Systems, Pearson Education, 2011.
3. C.J. Date, An Introduction to Database Systems, Pearson Education, 2004.

4. S. Shah and V. Shah, Oracle for Professionals, The XTeam, SPD, 2008.
5. Shah, Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, PHI, 2004.
6. M. L. Gillenson, Fundamentals of Database Management Systems, Wiley Student Edition, 2011..

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B. Tech. V Semester **L T P C**
0 0 2 1

Subject Code: 22EN506HS

1. INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at the 3rd-year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak, and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. Activities on Fundamentals of Inter-Personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language
   – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. Activities on Reading Comprehension –General vs. local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
3. Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

4. Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency, and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through teleconference & video-conference and Mock Interviews.

4. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS:

1. Learn Correct English – A Book of Grammar, Usage, and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007.
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning Pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.

UI DESIGN-FLUTTER

B. Tech. V Semester

L	T	P	C
0	0	2	1

Subjects Code: 22CY507PC

Course Objectives:

1. To learn about how to setup the environment for user interface design.
2. To know how to develop responsive user interfaces using flutter.
3. To apply stateful and stateless widgets to the user interface.
4. To create custom widgets for specific UI elements.
5. To learn about designing a form in various input fields, along with validation.

Course Outcomes: After completion of this course, the students will be able to:

1. Build the environment for user interface design using flutter SDK
2. Develop responsive user interfaces using flutter.
3. Apply stateful and stateless widgets to the user interface.
4. Create custom widgets for specific UI elements.
5. Design a form with various input fields, along with validation and error handling.

List of Experiments: Students need to implement the following experiments

1. a) Installation of Flutter and Dart SDK.
   b) Write a simple Dart program to understand the language basics.
2. a) Explore various Flutter widgets (Text, Image, Container, etc.).
   b) Implement different layout structures using Row, Column, and Stack widgets.
3. a) Design a responsive UI that adapts to different screen sizes.
   b) Implement media queries and breakpoints for responsiveness.
4. a) Set up navigation between different screens using Navigator.
   b) Implement navigation with named routes.
5. a) Demonstrate stateful and stateless widgets.
   b) Implement state management using set State and Provider.
6. a) Create custom widgets for specific UI elements.
   a) Apply styling using themes and custom styles.
7. a) Design a form with various input fields.
   b) Implement form validation and error handling.
8. a) Add animations to UI elements using Flutter's animation framework.
   b) Experiment with different types of animations (fade, slide, etc.).
9. a) Fetch data from a REST API.
   b) Display the fetched data in a meaningful way in the UI.
10. a) Write unit tests for UI components.
    b) Demonstrate the use of Flutter's debugging tools to identify and fix issues.

TEXT BOOK:

1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.

WEB LINKS:

1. https://onlinecourses.nptel.ac.in/noc21_ar05/preview
2. https://www.coursera.org/projects/googlecloud-getting-started-with-flutter-development-guo1q
3. https://www.udemy.com/course/the-complete-flutter-ui-course-build-amazing-mobile-ui/

INTELLECTUAL PROPERTY RIGHTS

B. Tech. V Semester **L T P C**
3 0 0 0

Subjects Code: 22CY508MC

Prerequisites: NILL

Course Objectives:
1. To explore intellectual property rights.
2. To outline the basics of trademarks.
3. To describe the copyrights and its laws.
4. To learn about the nature of trade secrets and unfair competition.
5. To define the new developments of intellectual property rights.

Course Outcomes: After completion of this course, the students will be able to:
1. Interpret intellectual property rights.
2. Identify different types of trademarks and related laws.
3. Examine copyrights and their laws.
4. Differentiate the trade secrets and unfair competition.
5. Enumerate the new developments of intellectual property.

UNIT– I **[7 Lectures]**
Introduction to Intellectual Property: Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

UNIT– II **[7 Lectures]**
Trademarks: Purpose and Function of Trademarks, Acquisition of Trade Mark Rights, Protectable Matter, Selecting and Evaluating Trademark, Trademark Registration Processes.

UNIT– III **[10 Lectures]**
Law of Copy Rights: Fundamental of Copy Right Law, Originality of Material, Rights of Reproduction, Rights to Perform the Work Publicly, Copy Right Ownership Issues, Copyright Registration, Notice of Copy Right, International Copy Right Law.
Law Of Patents: Foundation of Patent Law, Patent Searching Process, Ownership Rights and Transfer.

UNIT– IV **[8 Lectures]**
Trade Secrets: Trade Secrete Law, Determination of Trade Secrete Status, Liability for Misappropriation of Trade Secrets, Protection for Submission, Trade Secrete Litigation.
Unfair Competition: Misappropriation of Right of Publicity, False Advertising.

UNIT– V **[8 Lectures]**
New Development of Intellectual Property: New Developments in Trademark Law, Copy Right Law, Patent Law, Intellectual Property Audits, International Overview on Intellectual Property, International Trademark Law, Copyright Law, International Patent Law, International Development in Trade Secrets Law.

TEXT BOOKS:

1. Deborah E. Bouchoux, Intellectual Property: The Law Of Trademarks Copyrights Patents And Trade Secrets, 4Th Edn, Cengage India, 2015.
2. Prabuddha Ganguli, Intellectual property right – Unleashing the knowledge economy, McGraw Hill Education, 1st edition, 2017.

REFERENCEBOOKS:

1. William M. Landes, Richard A. Posner, The Economic Structure of Intellectual Property Law, Belknap Press, Illustrated edition, 2003.
2. Rami M. Olwan, Intellectual Property, and Development: Theory and Practice, Springer-Verlag Berlin and Heidelberg GmbH & Co. K, 2013th edition, 2015.
3. VK Ahuja, Law Relating to Intellectual Property Rights, Lexis Nexis, Third edition,2017.

WEB LINKS:

1. https://onlinecourses.nptel.ac.in/noc22_hs59/preview
2. https://www.coursera.org/learn/introduction-intellectual-property
3. https://www.udemy.com/topic/intellectual-property/
4. https://allea.org/intellectual-property-rights/
5. https://www.stopfakes.gov/Online-Intellectual-Property-Training-Module

CYBER SECURITY ESSENTIALS

B. Tech. VI Semester **L T P C**
3 0 0 3

Subjects Code: 22CY601PC

Prerequisites: Network Security

Course Objectives:

1. Understand fundamental concepts of cyber security, including information assurance,cryptography, network security, and Windows security principles.
2. Understand fundamental concepts of Attacker Techniques and Windows security principles
3. Explore attacker techniques, motivations, and exploitation methods, gaining insights into cyberthreats and vulnerabilities.
4. Understand Viruses. Evading Detection and ElevatingPrivileges.
5. Explore the Defense and Analysis Techniques

Course Outcomes:

1. Understand basic cryptographic techniques for securing information and analyze cyber threatsusing concepts such as proxies, tunneling, and fraud techniques.
2. Develop skills in identifying and exploiting vulnerabilities, including shellcode.
3. Analyze Buffer overflows,SQL injection, and web exploit tools.
4. Demonstrate knowledge of malicious code, its types (worms, viruses), and countermeasuresagainst evasion, privilege escalation, and information theft.
5. Analyze defense and analysis techniques, including memory forensics, honeypots, andintrusion detection systems, for proactive cybersecurity measures.

UNIT- I **[12 Lectures]**

Cyber Security Fundamentals: Network and Security Concepts- Information Assurance Fundamentals, Basic Cryptography, Symmetric Encryption, Public Key Encryption, The Domain NameSystem (DNS), Firewalls, Virtualization, Radio-Frequency Identification

Microsoft Windows Security Principles: Windows Tokens, Window Messaging, Windows Program,The Windows firewalls

UNIT- II **[8 Lectures]**

Attacker Techniques and Motivations: Hackers Cover Their Tracks (Anti forensics), Attackers Use Proxies, Tunneling Techniques, Fraud Techniques: Phishing, Smishing, Vishing, and Mobile Malicious Code, Threat Infrastructure, Botnets, Fast-Flux.

UNIT- III **[10 Lectures]**

Exploitation: Techniques to Gain a Foothold, Misdirection- Shellcode, Integer Overflow Vulnerabilities, Stack-Based Buffer Overflows, Format String Vulnerabilities, SQL Injection, Malicious PDF Files, RaceConditions, Web Exploit Tools, DoS Conditions, Brute Force and Dictionary Attacks, Reconnaissance, and Disruption Methods- Cross-Site Scripting (XSS), Social Engineering, WarXing, DNS AmplificationAttacks

UNIT- IV **[10 Lectures]**

Malicious Code: Self-Replicating Malicious Code- Worms, Viruses. Evading Detection and Elevating Privileges- Obfuscation, Virtual Machine Obfuscation, Persistent Software Techniques, Rootkits, Spyware, Attacks against Privileged User Accounts and Escalation of Privileges, Token Kidnapping, Virtual Machine Detection. Stealing Information and Exploitation- Form Grabbing, Man-in-the-Middle Attacks, DLL Injection, Browser Helper Objects

UNIT- V **[8 Lectures]**

Defense and Analysis Techniques: Memory Forensics: Memory Analysis Frameworks, Dumping Physical Memory, Installing and Using Volatility, Honeypots, Malicious Code Naming, Automated Malicious Code Analysis Systems, Intrusion Detection Systems.

TEXT BOOK:

1. James Graham, Richard Howard, Ryan Olson, "Cyber Security Essentials", CRC Press, Taylor& Francis Group, 2011.

REFERENCE BOOK:

1. Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, "Fundamental of Cyber Security(Principles, Theory and Practices) BPB Publications 2018.

WEB LINKS:

1. https://onlinecourses.swayam2.ac.in/nou24_ge24/preview
2. https://youtu.be/vInCm7Xz0sI?si=ckesfoBdKaT9du06

ALGORITHM DESIGN AND ANALYSIS

B. Tech. VI Semester **L T P C**
3 0 0 3

Subjects Code: 22CY602PC

Prerequisites:
1. A course on "Computer Programming and Data Structures".
2. A course on "Advanced Data Structures".

Course Objectives:
1. Introduces the notations for analysis of the performance of algorithms.
2. Describes major algorithmic techniques and mention problems for which each technique is appropriate;
3. Describes how to evaluate and compare different algorithms using worst, average, and best-case analysis.
4. To solve problems using algorithm design methods such as backtracking and branch and bound.
5. Explain the difference between tractable and intractable problems, and introduce the problems that are P, NP, and NP-complete.

Course Outcomes: After completion of this course, the students will be able to:
1. Analyze the performance of algorithms
2. Design the algorithm using the divide and conquer greedy approach.
3. Implement a dynamic programming strategy.
4. Apply the backtracking technique and branch and bound.
5. Construct the algorithm using the non-deterministic algorithm.

UNIT – I **[10 Lectures]**

Introduction: Algorithm, Performance Analysis: Space complexity, Time complexity; Asymptotic Notations: Big Oh Notation, Omega Notation, Theta Notation, and Little Oh Notation.

Divide and Conquer: General Method, Applications: Binary Search, Quick Sort, Merge Sort, Strassen's Matrix Multiplication.

UNIT – II **[8 Lectures]**

Disjoint Sets: Disjoint Set Operations, Union and Find Algorithms, Priority Queue, Heaps, Heapsort.

Backtracking: General Method, Applications, N-Queen's Problem, Sum of Subsets Problem, Graph Coloring, Hamiltonian Cycles.

UNIT – III **[8 Lectures]**

Dynamic Programming: General Method, Applications: Optimal Binary Search Tree, 0/1 Knapsack Problem, All Pairs Shortest Path Problem, Traveling Sales Person Problem, Reliability Design.

UNIT – IV **[8 Lectures]**

Greedy Method: General Method, Applications: Job Sequencing with Deadlines, Knapsack Problem, Minimum Cost Spanning Trees, Single Source Shortest Path Problem.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected Components, Biconnected Components.

UNIT – V **[10 Lectures]**

Branch and Bound: General Method, Applications: Travelling Sales Person Problem, 0/1 Knapsack Problem: LC Branch and Bound Solution, FIFO Branch and Bound Solution.

NP-Hard and NP-Complete Problems: Basic Concepts, Non-Deterministic Algorithms, NP-Hard and NP-Complete Classes, Cook's Theorem.

TEXTBOOK:

1. Ellis Horowitz, Sartaj Sahni and S. Raja sekharan, Fundamentals of Computer Algorithms, 2nd Edition, Universities Press, 2012.
2. P. H. Dave, H.B . Dave, Design and Analysis of Algorithms,2nd edition, Pearson Education, 2013.

REFERENCEBOOKS:

1. M.T. Good Rich and R. Tomassia, Algorithm Design: Foundations, Analysis, and Internet examples, John Wiley and Sons, 2001.
2. S. Sridhar, Design and Analysis of Algorithms, Oxford Univ.Press,2014.
3. Aho, Ullman, and Hop Croft, Design and Analysis of algorithms, Pearson Education, 1st Edition, 2002.
4. R. Neapolitan and K.Naimipour, Foundations of Algorithms,4thedition, Jones And Bartlett India Private Limited, 2010.
5. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and Stein, Introduction to Algorithms, 3rd Edition, PHI, 2010.

WEB LINKS:

1. https://onlinecourses.nptel.ac.in/noc19_cs47/preview
2. https://www.coursera.org/learn/analysis-of-algorithms
3. https://www.udemy.com/course/design-and-analysis-of-algorithms/
4. https://www.classcentral.com/course/youtube-design-and-analysis-of-algorithms-daa-46806

MALWARE ANALYSIS

B. Tech. VI Semester **L T P C**
3 0 0 3

Subjects Code: 22CY603PC

Prerequisites

1. A course on "Computer Networks and Operating Systems"
2. A course on "Cybersecurity Basics"
3. A course on "Digital Forensics Fundamentals"

Course Objectives

1. Explain the different types of malware and their characteristics. Analyze the motivations behind malware creation and distribution.
2. Apply static and dynamic analysis techniques to dissect malicious code.
3. Demonstrate proficiency in analyzing network traffic for signs of malware.
4. Apply incident response procedures to handle malware incidents.
5. Analyze current malware trends and understand evolving threats.

Course Outcomes:

1. Analyze various types of malware using both static and dynamic analysis techniques.
2. Analyze network traffic to identify and trace malware communication.
3. Implementing effective incident response procedures and handling malware incidents.
4. skills in memory forensics, enabling them to extract relevant information for malware investigations.
5. The latest malware trends and understand the evolving threat landscape.

UNIT – I **[12 Lectures]**

Introduction to Malware: Basic Static Techniques, Antivirus Scanning, Hashing, Finding Strings, Packed and Obfuscated Malware-Packing Files, Detecting Packets with PEiD, Portable Executable File Format, Linked Libraries and Functions-Static, Runtime and Dynamic Linking, Exploring Dynamically Linked Functions with Dependency Walker, Imported Functions, Exported Functions. The PE File Headers and Sections.

UNIT – II **[10 Lectures]**

The Malware Analysis in Virtual Machines: The structure of a Virtual Machine, Creating Malware Analysis Machine-Configuring VMware, Using Malware Analysis Machine-Connecting Malware to the Internet, Connecting and Disconnecting Peripheral Devices, Taking Snapshots, Transferring files from a Virtual Machine. The Risks of Using VMware for Malware Analysis. Record/Replay-Running Computer in Reverse.

UNIT – III **[10 Lectures]**

Basic Dynamic Analysis: The Quick and Dirty Approach-Using a Malware Sandbox, Sandbox Drawbacks. Running Malware, monitoring with Process Monitor-The Procmon Display, Filtering in Procmon, Viewing Processes with Process Explorer- The Process Explorer Display, Using the Verify

Option, Comparing Strings, Using Dependency Walker, Analyzing Malicious Documents, Comparing Registry Snapshots with Regshot, faking a Network-Using ApateDNS, Monitoring with Netcat, Packet niffing with Wireshark.

UNIT – IV **[10 Lectures]**

Analysing Malicious Windows Programs: The Windows API-Types and Hungarian Notation, Handles, File System Functions, Special Files. The Window Registry-Registry Root Keys, Regedit, Programs that Run Automatically, Common Registry Functions, Applying Registry Code, Registry Scripting with Reg Files. Networking API-Berkeley Compatible Sockets, The Server and Client Sides of Networking, The WinNet API. Running Malware- DLLs, Processes, Threads, Interprocess Coordination with Mutexes, Services, The Component Object Model, and Exceptions.

UNIT – V **[8 Lectures]**

Malware Behavior: Downloaders and Launchers, Backdoors-Reverse Shell, RATs, Botnets. Credential Stealers- GINA Interception, Hash Dumping, Keystroke Logging. Persistence The Windows Registry, Trojanized System Binaries, DLL Load-Ordeer Hijacking. Privilege Escalation-Using SeDebugPrivilege, covering its Tracks-User Mode Rootkits-IAT Hooking, Inline Hooking

TEXTBOOKS:

1. Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software" by Michael Sikorski, Andrew Honig
2. Malware Analyst's Cookbook and DVD: Tools and Techniques for Fighting Malicious Code" by Michael Ligh, Steven Adair, Blake Hartstein

REFERENCES:

1. Network Forensics: Tracking Hackers through Cyberspace" by Sherri Davidoff, Jonathan Ham
2. Incident Response & Computer Forensics" by Jason Luttgens, Matthew Pepe, Kevin Mandia
3. Advanced Malware Analysis" by Christopher C. Elisan
4. The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory" by Michael Hale Ligh, Andrew Case, Jamie Levy

WEBLINKS

1. https://www.techtarget.com/searchsecurity/tip/10-cybersecurity-certifications-to-boost-your-career-in-2021
2. https://www.techtarget.com/searchsecurity/CyberResiliency/What-to-Look-for-in-a-Secure-Cloud-Portfolio-to-Optimize-Federal-Cybersecurity-Investments
3. https://www.youtube.com/watch?v=hXSFdwIOfnE
4. https://www.youtube.com/watch?v=EKdZutMkmTE
5. https://uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf

MOBILE APPLICATION SECURITY (Professional Elective – III)

B. Tech. VI Semester **L T P C**
3 0 0 3

Subjects Code: 22CY631PE

Prerequisites: Network Security.

Course Objectives:

1. Understanding of mobile platforms, including attack surfaces,risk landscape & more.
2. Define the security controls of multiple mobile operating systems
3. Understand and analyze Bluetooth technology
4. understand and analyze the overview of SMS security and Enterprise security.
5. To Learn Enterprise Security on the Mobile OS Device Security Options and Encryption

Course Outcomes:

1. Gain knowledge on mobile platforms, including attack surfaces, risk landscape & more.
2. Knowledge on the security controls of multiple mobile operating systems
3. Analyze Bluetooth technology
4. Analyze an overview of SMS security and Enterprise security.
5. Explore the Enterprise Security on the Mobile OS Device Security Options and Encryption

UNIT- I **[12 Lectures]**

Top Mobile Issues and Development Strategies: Top Issues Facing Mobile Devices, Physical Security, Secure Data Storage (on Disk), Strong Authentication with Poor Keyboards, Multiple-User Support with Security, Safe Browsing Environment, Secure Operating Systems, Application Isolation, Information Disclosure, Virus, Worms, Trojans, Spyware, and Malware, Difficult Patching/Update Process, Strict Use and Enforcement of SSL, Phishing, Cross-Site Request Forgery (CSRF), Location Privacy/Security, Insecure Device Drivers, Multi Factor Authentication, Tips for Secure Mobile Application Development.

UNIT- II **[10 Lectures]**

WAP and Mobile HTML Security WAP and Mobile HTML Basics, Authentication on WAP/Mobile HTMLSites, Encryption, Application Attacks on Mobile HTML Sites, Cross-Site Scripting, SQL Injection, Cross-Site Request Forgery, HTTP Redirects, Phishing, Session Fixation, Non-SSL Login, WAP and Mobile Browser Weaknesses, Lack of HTTP Only Flag Support, Lack of SECURE Flag Support, Handling Browser Cache, WAP Limitations.

UNIT- III **[10 Lectures]**

Bluetooth Security Overview of the Technology, History and Standards, Common Uses, Alternatives, Future, Bluetooth Technical Architecture, Radio Operation and Frequency, Bluetooth Network Topology, Device Identification, Modes of Operation, Bluetooth Stack, Bluetooth Profiles, Bluetooth Security Features, Pairing, Traditional Security Services in Bluetooth, Security "Non-Features", Threats to Bluetooth Devices and Networks, Bluetooth Vulnerabilities, Bluetooth Versions Prior to v1.2, Bluetooth Versions Prior to v2.1. Security for 1g Wi-Fi Applications, Security for 2G Wi-Fi Applications,Recent Security Schemes for Wi-Fi Applications

UNIT- IV **[10 Lectures]**

SMS Security Overview of Short Message Service, Overview of Multimedia Messaging Service, Wireless Application Protocol (WAP), Protocol Attacks, Abusing Legitimate Functionality, Attacking Protocol Implementations, Application Attacks, iPhone Safari, Windows Mobile MMS, Motorola RAZR JPG Overflow, Walkthroughs, Sending PDUs, Converting XML to WBXML.

UNIT- V **[8 Lectures]**

Enterprise Security on the Mobile OS Device Security Options, PIN, Remote, Secure Local Storage, Apple iPhone and Keychain, Security Policy Enforcement, Encryption, Full Disk Encryption, E-mail Encryption, File Encryption, Application Sandboxing, Signing, and Permissions, Application Sandboxing, Application Signing, Permissions, Buffer Overflow Protection, Windows Mobile, iPhone, Android, BlackBerry, Security Feature Summary.

TEXTBOOKS:

1. Himanshu Dwivedi, Chris Clark, David Thiel, Mobile Application Security, First edition, Tata McGraw Hill.

REFERENCE BOOKS:

1. Kami S. Makki, et al, Mobile and Wireless Network Security and Privacy, Springer.
2. Abhishek Dubey, Android Security Attacks Defenses, CRC Press.

WEBLINKS

1. https://www.craw.in/courses/mobile-application-security-course-in-delhi/
2. https://www.iisecurity.in/courses/mobile-security-training-course.php
3. https://www.synopsys.com/software-integrity/training/software-security-courses/mobile-application-security-training.html
4. https://owasp.org/www-project-mobile-app-security/
5. https://www.coursera.org/courses?query=application%20security

MACHINE LEARNING (Professional Elective – III)

B. Tech. VI Semester **L T P C**
3 0 0 3

Subjects Code: 22CY632PE

Prerequisites:
1. A course on "Mathematical and Statistical Foundations"
2. A course on "Programming with Python".
3. A course on "Data Structures"

Course Objectives:
1. To introduce the basic concepts of Machine Learning.
2. To learn about multi-layer perceptron and radial basis functions.
3. To know about decision trees and ensemble learning.
4. To learn about dimensionality reduction and evolutionary learning.
5. To know about Reinforcement learning and Markov Chain Monte Carlo methods.

Course Outcomes: After completion of this course, the students will be able to:
1. Enumerate the basic concepts of machine learning.
2. Build classifiers using multi-layer perceptron and support vector machine.
3. Apply ensemble learning to increase classification accuracy.
4. Make use of dimensionality reduction and evolutionary computing algorithms.
5. Apply Markov Chain Monte Carlo methods on real datasets.

UNIT – I **[12 Lectures]**

Introduction: Learning, Types of Machine Learning, Supervised Learning, The Brain and the Neuron, Design a Learning System, Perspectives and Issues in Machine Learning, Concept Learning Task, Concept Learning as Search, Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination Algorithm, Linear Discriminates, Perceptron, Linear Separability, Linear Regression.

UNIT – II **[10 Lectures]**

Multi-layer Perceptron: Going Forwards, Going Backwards, Back Propagation Error, Multi-layer Perceptron in Practice, Examples of using the MLP, Deriving Back-Propagation.
Radial Basis Functions and Splines: Concepts, RBF Network, Curse of Dimensionality, Interpolations and Basis Functions, Support Vector Machine.

UNIT – III **[10 Lectures]**

Learning with Trees: Decision Trees, Constructing Decision Trees, Classification and Regression Trees.
Ensemble Learning: Boosting, Bagging, Different Ways to Combine Classifiers, Basic Statistics, Gaussian Mixture Models, Nearest Neighbour Methods
Unsupervised Learning: K means Algorithm.

UNIT - IV **[9 Lectures]**

Dimensionality Reduction: Linear Discriminant Analysis, Principal Component Analysis, Factor Analysis, Independent Component Analysis, Locally Linear Embedding, Isomap, Least Squares Optimization.

Evolutionary Learning: Genetic algorithms, Genetic Offspring, Genetic Operators, using Genetic Algorithms.

UNIT - V **[9 Lectures]**

Reinforcement Learning: Overview of reinforcement learning, Getting Lost Example.

Markov Chain Monte Carlo Methods: Sampling, Proposal Distribution, Markov Chain Monte Carlo.

Graphical Models: Bayesian Networks, Markov Random Fields, Hidden Markov Models, Tracking Methods.

TEXTBOOKS:

1. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and all/CRC Machine Learning and Pattern Recognition Series, 2014.

REFERENCE BOOKS:

1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands-on for Developers and Technical Professionals, First Edition, Wiley, 2014
4. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

WEBLINKS:

1. https://www.geeksforgeeks.org/machine-learning.
2. https://onlinecourses.nptel.ac.in/noc23_cs18/preview

DEVOPS (Professional Elective – III)

B. Tech. VI Semester **L T P C**
3 0 0 3

Subject Code: 22CY633PE

Pre-Requisites:
1. A course on "Software Engineering".
2. A course on "Software Project Management"

Course Objectives:
1. To describe the agile relationship between development and IT operations.
2. To know the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
3. To explore project management tools.
4. To understand system integration.
5. To impart testing tools, automation, and deployment of the system.

Course Outcomes: After completion of this course, the students will be able to:
1. Explore various components of the DevOps environment.
2. Identify Software development models and architectures of DevOps.
3. Apply different project management models.
4. Investigate different DevOps Software development models, and integration, Collaborate and adopt DevOps in real-time projects.
5. Assess various DevOps practices, testing, and code deployment tools.

UNIT- I **[9 Lectures]**

Introduction to DevOps:

Introduction, Agile Development Model, DevOps and ITIL, DevOps Process and Continuous Delivery, Release Management, Scrum, Kanban, Delivery Pipeline, Identifying Bottlenecks.

UNIT- II **[9 Lectures]**

Software Development Models and DevOps:

DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing; DevOps Influence on Architecture: Introducing Software Architecture, Monolithic Scenario, Architecture Rules of Thumb, Separation of Concerns, Handling Database Migrations, Micro Services and Data Tier, DevOps, Architecture, Resilience.

UNIT- III **[9 Lectures]**

Introduction to Project Management:

The Need for Source Code Control, The History of Source Code Management, Roles and Code, Source Code Management System and Migrations, Shared Authentication, Hosted Git Servers, Different Git Server Implementations, Docker Intermission, Gerrit, The Pull Request Model, GitLab.

UNIT- IV **[9 Lectures]**

Integrating the System:

Build Systems, Jenkins Build Server, Managing Build Dependencies, Jenkins Plugins, File System Layout, The Host Server, Build Slaves, Software on the Host, Triggers, Job Chaining and Build

Pipelines, Build Servers and Infrastructure as Code, Building by Dependency Order, Build Phases, Alternative Build Servers, Collating Quality Measures.

UNIT- V **[10 Lectures]**

Testing Tools and Deployment:

Various Types of Testing, Automation of Testing Pros and Cons; Selenium: Introduction, Selenium Features, JavaScript Testing, Testing Backend Integration Points, Test-Driven Development, REPL-Driven Development; Deployment of the System: Deployment Systems, Virtualization Stacks, Code Execution at the Client, Puppet Master and Agents, Ansible; Deployment Tools: Chef, Salt Stack and Docker.

TEXTBOOK:

1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley.

WEB LINKS:

1. https://nptel.ac.in/courses/128106012
2. https://elearn.nptel.ac.in/shop/iit-workshops/completed/azure-devops-and-micro-services-azurekubernetes-deployment-models/
3. https://www.coursera.org/learn/intro-to-devops
4. https://www.udemy.com/course/devops-fundamentals-for-beginners/
5. https://dev.to/javinpaul/my-favorite-free-courses-to-learn-devops-in-2023-4h6m
6. https://www.udemy.com/topic/DevOps/?utm_source=adwords&utm_medium=udemyads&utm_campaign=Brand-Topic_la.EN_cc.INDIA&utm_content=deal4584&utm_term=
7. https://www.techtarget.com/whatis/feature/9-best-free-DevOps-certifications-and-training-courses
8. https://elearn.nptel.ac.in/shop/iit-workshops/completed/azure-devops-and-micro-services-azurekubernetes-deployment-models/
9. https://www.coursera.org/learn/intro-to-devops
10. https://www.udemy.com/course/devops-fundamentals-for-beginners/
11. https://dev.to/javinpaul/my-favorite-free-courses-to-learn-devops-in-2023-4h6m
12. https://www.udemy.com/topic/DevOps/?utm_source=adwords&utm_medium=udemyads&utm_campaign=Brand-Topic_la.EN_cc.INDIA&utm_content=deal4584&utm_term=
13. https://www.techtarget.com/whatis/feature/9-best-free-DevOps-certifications-and-training-courses

MOBILE APPLICATION DEVELOPMENT (Professional Elective – III)

B. Tech. VI Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY634PE

Prerequisites:
1. A Course on "JAVA programming"
2. A Course on "DBMS"

Course Objectives
1. To demonstrate their understanding of the fundamentals of Android operating systems.
2. To improve the skills of using Android software development tools.
3. To learn to broadcast and notifications on a mobile platform.
4. To explore persistent storage.
5. To understand the database for mobile applications.

Course Outcomes: After completion of this course, the students will be able to:
1. Work on Android OS Practically.
2. Apply the concepts of mobile applications and user interfaces on Android.
3. Develop the broadcast and notifications on mobile applications.
4. Create persistent storage for Android Applications.
5. Design a database for mobile Android Applications.

UNIT – I **[12 Lectures]**

Introduction to Android Operating System: Android OS Design and Features, Android Development Framework, SDK Features, Installing and Running Applications on Android Studio, Creating AVDs, Types of Android Applications, Best Practices in Android Programming, and Android Tools.

Android Application Components: Android Manifest File, Externalizing Resources Like Values, Themes, Layouts, Menus, etc., Resources for Different Devices and Languages, Runtime Configuration Changes.

Android Application Lifecycle: Activities, Activity Lifecycle, Activity States, Monitoring State Changes.

UNIT – II **[12 Lectures]**

Android User Interface: Measurements: Device and Pixel Density, Independent Measuring Units; Layouts: Linear, Relative, Grid and Table Layouts.

User Interface (UI) Components: Editable and Non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and Pickers.

Event Handling: Handling Clicks or Changes of Various UI Components.

Fragments: Creating Fragments, Lifecycle of Fragments, Fragment States, Adding Fragments to Activity, Adding, Removing, and Replacing Fragments with Fragment Transactions, Interfacing Between Fragments and Activities, Multi-Screen Activities.

UNIT – III **[10 Lectures]**

Intents and Broadcasts: Intent: Using Intents to Launch Activities, Explicitly Starting New Activity, Implicit Intents, Passing Data to Intents, Getting Results from Activities, Native Actions, Using Intent to Dial a Number or to Send SMS.

Broadcast Receivers: Using Intent Filters to Service Implicit Intents, Resolving Intent Filters, Finding and Using Intents Received within an Activity.

Notifications: Creating and Displaying Notifications, Displaying Toasts.

UNIT – IV **[10 Lectures]**

Persistent Storage: Files: Using Application Specific Folders and Files, Creating Files, Reading Data from Files, Listing Contents of a Directory Shared Preferences, Creating Shared Preferences, Saving and Retrieving Data using Shared Preference, Introducing Structured Data Storage in Android, Storing Data using the Room Persistence Library, Accessing Files from other Applications using Storage Access Framework, Requesting Temporary Access to Files, Requesting Persistent Access to Files, Requesting Access to Directories.

UNIT – V **[10 Lectures]**

Database: Introduction to SQLite Database, Creating and Opening a Database, Creating Tables, Inserting, Retrieving and Etindelg Data, Registering Content Providers, Using Content Providers (Insert, Delete, Retrieve and Update).

Advanced Topics: Alarms: Creating and using Alarms; Using Internet Resources: Connecting to Internet Resource, Using Download Manager; Location Based Services: Finding Current Location and Showing Location on the Map, Updating Location.

TEXTBOOK:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012

REFERENCE BOOKS:

1. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

WEB LINKS:

1. https://onlinecourses.swayam2.ac.in/nou21_ge41/preview
2. https://www.coursera.org/courses?query=mobile%20app%20development
3. https://www.udemy.com/topic/mobile-development/
4. https://www.mygreatlearning.com/mobile-app-development/free-courses
5. https://techreviewer.co/blog/best-free-open-source-app-development-software-solutions

BLOCKCHAIN TECHNOLOGY (Professional Elective – III)

B. Tech. VI Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY635PE

Prerequisites:

1. Knowledge in information security and applied cryptography.
2. Knowledge of Computer Networks

Course Objectives:

1. To learn the fundamentals of Blockchain and various types of blockchain and consensusmechanisms.
2. To understand the public blockchain system, Private blockchain system, and consortiumblockchain.
3. To Understand frameworks related to public, private, and hybrid blockchain
4. Able to know the security issues of blockchain technology.
5. To learn the concept of blockchain for different application case studies

Course Outcomes:

1. Understanding concepts behind cryptocurrency
2. Applications of smart contracts in decentralized application development
3. Understand frameworks related to public, private, and hybrid blockchain
4. Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges in Blockchain
5. Create blockchain for different application case studies

UNIT-I **[12 Lectures]**

Fundamentals of Blockchain: Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future.

Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Typesof Blockchain, Consensus Protocol.

Cryptocurrency – Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage.

UNIT-II **[10 Lectures]**

Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchain, The BitcoinBlockchain, Ethereum Blockchain.

Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.

UNIT-III **[10 Lectures]**

Private Blockchain System: Introduction, Key Characteristics of Private Blockchain, Need of PrivateBlockchain, Private Blockchain Examples, Private Blockchain and Open Source, E-commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain.

Consortium Blockchain: Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda. Initial Coin Offering: Introduction, Blockchain Fundraising Methods, launching an ICO, Investing in anICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

UNIT-IV **[10 Lectures]**

Security in Blockchain: Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric.

Applications of Blockchain: Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real Estate, Blockchain in Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

UNIT-V **[8 Lectures]**

Blockchain Case Studies: Case Study 1 – Retail, Case Study 2 – Banking and Financial Services,Case Study 3 – Healthcare, Case Study 4 – Energy and Utilities.

Blockchain Platform using Python: Introduction, Learn How to Use Python Online Editor, BasicProgramming Using Python, Python Packages for Blockchain.

Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyper ledger FabricNetwork, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

TEXTBOOK:

1. Chandramouli Subramanian, Asha A. George, Abhilasj K A, and Meena Karthikeyan "Blockchain Technology", Universities Press.

REFERENCE BOOKS:

1. Michael Juntao Yuan, Building Blockchain Apps, Pearson, India.
2. Melanie Swan, Blockchain Blueprint for Economy, SPD O'Reilly.
3. Jai Singh Arun, Jerry Cuomo, Nitin Gaur Blockchain for Business, Pearson.

WEBLINKS:

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview
2. NPTEL & MOOC courses titled blockchain technology
3. blockgeeks.comguide/what-is-block-chain-technology
   https://nptel.ac.in/courses/106105184/

CYBER LAWS (Open Elective – I)

B. Tech. VI Semester **L T P C**
3 0 0 3

Subjects Code: 22CY611OE

Prerequisites: NILL

Course Objectives:

1. Understanding of the evolution and jurisprudence of cyber law in India, including the ITAct 2000.
2. To Learn about digital signatures, e-governance, and their legal implications under the IT Act.
3. Understand the legal framework for electronic contracts, their formation, and internationalperspectives.
4. To Study the legal framework for Regulatory Authorities
5. To introduce taxation issues in cyberspace, cybercrimes, electronic evidence, and their adjudication under the IT Act.

Course Outcomes

1. Learn the evolution and key aspects of Indian cyber law, including recent amendments.
2. Gain knowledge about the legalities of digital signatures and the role of e-governance in the ITAct.
3. Develop an understanding of the legalities involved in electronic contracts and internationalconventions.
4. Knowledge of the legal framework for Regulatory Authorities
5. Adapt in understanding and analyzing cybercrime, electronic evidence, and intellectual property rights in the context of IT.

UNIT – I **[12 Lectures]**

Introduction: History of the Internet and World Wide Web, need for cyber law, Cybercrime on the rise,Important terms related to cyber law.
Cyber law in India: Need for cyber law in India, History of cyber law in India.
Information Technology Act, 2000: Overview of other laws amended by the IT Act, 2000, NationalPolicy on Information Technology 2012.

UNIT – II **[10 Lectures]**

Overview of the Information Technology Act, 2000: Applicability of the Act, Important provisions ofthe Act: Digital signature and electronic signature, Digital Signature under the IT Act, 2000, E-Governance Attribution, Acknowledgement and Dispatch of Electronic Records, Certifying Authorities,Electronic Signature Certificates, Duties of Subscribers, Penalties and Offences, Intermediaries.

UNIT – III **[8 Lectures]**

Overview of rules issued under The IT Act, 2000, Electronic Commerce, Electronic Contracts, Cyber Crimes, Cyber Frauds.

UNIT – IV **[10 Lectures]**

Regulatory Authorities: Department of Electronics and Information Technology, Controller of Certifying Authorities (CCA), Cyber Appellate Tribunal, Indian Computer Emergency Response Team(ICERT), Cloud Computing, Case Laws.

UNIT – V **[8 Lectures]**

Introduction to Cybercrime and procedure to report Cybercrime: procedure to report cybercrime,some basic rules for safe operations of the computer and internet, the criminal law (amendment) act, 2013: legislative remedies for online harassment and cyberstalking in India.

TEXTBOOK:

1. Pavan Duggal, "Cyber Law", second edition, Universal Law Publishing.
2. Pavan Duggal, "Indian Cyber law on Cybercrimes",

REFERENCE BOOKS:

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O'Reilly Media, 2006.
2. Thomas R. Peltier, "InformationSecurity policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.
3. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis andResponse Solutions", IGI Global, 2009.
4. Thomas R Peltier, Justin Peltier, and John Blackley," Information Security Fundamentals", 2ndEdition, Prentice Hall, 1996.

ETHICAL HACKING (Open Elective – I)

B. Tech. VI Semester **L T P C**
3 0 0 3

Subjects Code: 22CY612OE

Prerequisites:

1. A course on "Operating Systems".
2. A course on "Computer Networks".
3. A course on "Network Security and Cryptography".

Course Objectives:

1. To introduce the methodologies and framework of ethical hacking for enhancing security.
2. To Introduce the Course Impact of Hacking; Types of Hackers; Information Security Models;
3. To learn Information Security Programs; Business Perspective; and Planning a Controlled Attack.
4. To understand the Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation,Deliverable, and Integration).
5. To Study the Deliverable, The Document, Overall Structure, and Aligning Findings.

Course Outcomes:

1. Gain knowledge of the use and availability of tools to support an ethical hack
2. Gain the knowledge of interpreting the results of a controlled attack
3. Understand the role of politics, inherent and imposed limitations, and metrics for planning atest
4. Comprehend the dangers associated with penetration testing.
5. To Study the Deliverable, The Document, Overall Structure, and Aligning Findings.

UNIT- I **[12 Lectures]**

Introduction: Hacking Impacts, The Hacker Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration.

Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture

Information Security Program: The Process of Information Security, Component Parts of InformationSecurity Program, Risk Analysis and Ethical Hacking.

UNIT – II **[10 Lectures]**

The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement.

UNIT – III **[10 Lectures]**

Preparing for a Hack: Technical Preparation, Managing the Engagement Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance.

UNIT – IV **[10 Lectures]**

Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase.

Exploitation: Intuitive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, RootKits, applications, Wardialing, Networks, Services and Areas of Concern.

UNIT – V **[8 Lectures]**

Deliverable: The Deliverable, The Document, Overall Structure, Aligning Findings, Presentation Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, IncidentManagement, Security Policy, and Conclusion.

TEXTBOOK:

1. James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing",Auerbach Publications, CRC Press.

REFERENCE BOOKS:

1. EC-Council, "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning.
2. Michael Simpson, Kent Backman, James Corley, "Hands-On Ethical Hacking and NetworkDefense", Cengage Learning.

TEXTBOOKS:

1. Malware Analyst's Cookbook and DVD: Tools and Techniques for Fighting Malicious Code" by Michael Ligh, Steven Adair, Blake Hartstein
2. Network Forensics: Tracking Hackers through Cyberspace" by Sherri Davidoff, Jonathan Ham

REFERENCES:

1. Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software" by Michael Sikorski, Andrew Honig
2. Incident Response & Computer Forensics" by Jason Luttgens, Matthew Pepe, Kevin Mandia
3. Advanced Malware Analysis" by Christopher C. Elisan
4. The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory" by Michael Hale Ligh, Andrew Case, Jamie Levy
5. Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software" by Michael Sikorski, Andrew Honig

CYBER SECURITY ESSENTIALS LAB

B. Tech. VI Semester

L	T	P	C
0	0	2	1

Subjects Code: 22CY604PC

Prerequisites

- A course on "Network Security and Cryptography"

Course Objectives:

1. Understanding Cybersecurity Principles and Techniques.
2. Application of Security Tools and Methods.

Course Outcomes:

1. Practical Skills in Cybersecurity Tools and Techniques.
2. Analytical and Problem-Solving Abilities.

Lab Experiments

1. Implement and test simple symmetric encryption algorithms like AES and DES.
2. Implement RSA encryption to demonstrate the concept of public and private keys.
3. Set up and configure a basic firewall using tools like iptables on Linux.
4. Demonstrate DNS spoofing and DNS cache poisoning attacks.
5. Set up a proxy server and demonstrate how attackers can use proxies to hide their tracks.
6. Demonstrate basic antiforensics techniques like
   i. Deleting logs ii. Using steganography tools.
7. Perform SQL injection on a test website and then implement measures to prevent it.
8. Create a simple application vulnerable to buffer overflow and demonstrate how to exploit it.
9. Implement an XSS attack on a test web application and demonstrate ways to mitigate suchattacks.
10. Analyze a simple computer virus in a controlled environment and discuss detection andprevention strategies.
11. Investigate the functioning of a rootkit and demonstrate techniques to detect it.
12. Set up a basic IDS like Snort and test its effectiveness in detecting different types of attacks.

TEXTBOOK:

1. James Graham, Richard Howard, Ryan Olson, “Cyber Security Essentials”, CRC Press, Taylor& Francis Group, 2011.

REFERENCE BOOKS:

1. Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, “Fundamental Of Cyber Security(Principles, Theory and Practices) BPB Publications 2018

MALWARE ANALYSIS LAB

B. Tech. VI Semester

L	T	P	C
0	0	2	1

Subjects Code: 22CY605PC

Prerequisites:

- Knowledge of virtualization technologies like VMware, VirtualBox, or Hyper-V to create isolated environments.
- Linux utilities (such as pev, wrestool and Detect It Easy)

Course Objectives

1. Understand the different types of malware, including viruses, worms, trojans, ransomware, and more.
2. Explore the motivations behind malware creation and distribution.

Course Outcome

1. Ability to perform basic static analysis of malware samples using tools like IDA Pro,
2. Ghidra, and PEStudio to understand code structure, functions, and characteristics.
3. Development of critical thinking skills to analyze and solve complex problems related to Malware

List of Experiments:

1. a) Upload the files to VirusTotal and view the reports. Does either file match any existing antivirus signatures?
   b) When were these files compiled?
   c) Are there any indications that either of these files is packed or obfuscated? If so, what are these indicators?
   d) Do any imports hint at what this malware does? If so, which imports are they?
   e) Are there any other files or host-based indicators that you could look for on infected systems?
   f) What network-based indicators could be used to find this malware on infected machines?
   g) What would you guess is the purpose of these files?

2 a) Upload the Lab01-02.exe file to VirusTotal. Does it match any existing antivirus definitions?
b) Are there any indications that this file is packed or obfuscated? If so, what are these indicators?
c) Do any imports hint at this program's functionality? If so, which imports are they and what do they tell you?
d) What host or network-based indicators could be used to identify this malware on infected machines?

3 a) Upload the Lab01-03.exe file to VirusTotal. Does it match any existing antivirus definitions?

b) Are there any indications that this file is packed or obfuscated? If so, what are these indicators?

c) Do any imports hint at this program's functionality? If so, which imports are they and what do they tell you?

d) What host or network-based indicators could be used to identify this malware on infected machines?

4 a) Upload the Lab01-04.exe file to VirusTotal. Does it match any existing antivirus definitions?

b) Are there any indications that this file is packed or obfuscated? If so, what are these indicators?

c) When was this program compiled?

d) Do any imports hint at this program's functionality? If so, which imports are they and what do they tell you?

e) What host or network-based indicators could be used to identify this malware on infected machines?

f) This file has one resource in the resource section. Use Resource Hacker to examine that resource, and then use it to extract the resource. What can you learn from the resource?

TEXTBOOKS:

1. Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software"
2. by Michael Sikorski, Andrew Honig
3. Malware Analyst's Cookbook and DVD: Tools and Techniques for Fighting Malicious
   Code" by Michael Ligh, Steven Adair, Blake Hartstein

REFERENCES:

1. Network Forensics: Tracking Hackers through Cyberspace" by Sherri Davidoff, Jonathan Ham
2. Incident Response & Computer Forensics" by Jason Luttgens, Matthew Pepe, Kevin Mandia
3. Advanced Malware Analysis" by Christopher C. Elisan
4. The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and
   Mac Memory" by Michael Hale Ligh, Andrew Case, Jamie Levy

MOBILE APPLICATION SECURITY LAB (Professional Elective – III)

B. Tech. VI Semester **L T P C**
0 0 2 1

Subjects Code: 22CY631PL

Pre-requisites: Mobile Application Security

Course Objectives:

1. This course provides a thorough understanding of mobile platforms, including attack surfaces,risk landscape & more.

Course Outcomes:

1. Understand common mobile application security vulnerabilities
2. Understand and analyze the apks using different tools
3. Understand and implement authentication services.

List of Experiments

1. Use the following tools to analyze an apk to detect any existence of vulnerabilities
   a. QARK
   b. DEVKNOX
   c. OWASP
   d. DROZER
2. Implement Authentication: Single Sign-on
3. Implement Authentication: Two-Factor Authentication
4. Demonstrate how to Detect And Remove Malware From Android Phone
5. Demonstrate Remote Lock or Wipe

TEXTBOOK:

1. Himanshu Dwivedi, Chris Clark, David Thiel, Mobile Application Security, First edition, TATAMcGraw Hill.

REFERENCE BOOKS:

1. Kami S. Makki, et al, Mobile and Wireless Network Security and Privacy, Springer.
2. Abhishek Dubey, Android Security Attacks Defenses, CRC Press

MACHINE LEARNING LAB (Professional Elective – III)

B. Tech. VI Semester **L T P C**
0 0 2 1

Subjects Code: 22CY632PL

Prerequisites:
1. A Course on "Mathematical and Statistical Foundations".
2. A Course on "Programming with Python".
3. A Course on" Data Structure".

Course Objectives:
1. To learn about computing central tendency measures.
2. To gain knowledge about SciPy, pandas, and matplotlib libraries.
3. To learn about simple and multiple linear regression algorithms
4. To develop a machine learning model using decision tree, and KNN algorithms.
5. To apply logistic regression, K-Means algorithms for a problem.

Course Outcomes: After the completion of this course, the students will be able to:
1. Develop a program for computing central tendency measures.
2. Make use of SciPy, pandas, and matplotlib libraries for machine learning applications.
3. Develop simple and multiple linear regression algorithms
4. Build machine learning model using decision tree, and KNN algorithms.
5. Apply logistic regression, and K-Means algorithms for a problem.

List of Experiments:
1. Write a Python program to compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation
2. Write a Python program to demonstrate the use of statistics, math, NumPy, and SciPy libraries
3. Write a Python program to demonstrate a Machine Learning application using pandas, matplot lab libraries
4. Write a Python program to apply a simple linear regression algorithm for a regression problem
5. Write a Python program to apply multiple linear regression algorithms for house price prediction using the SK-learn library.
6. Write a Python program to apply a decision tree algorithm for a classification problem and perform parameter tuning for better results
7. Write a Python program to apply the KNN algorithm for a classification problem using the SK-learn library
8. Write a Python program to apply a Logistic regression algorithm for a classification problem using the SK-learn library
9. Write a Python program to apply the k-means algorithm for a clustering problem
10. Mini Project by including performance analysis of any three classification algorithms on a specific dataset

TEXTBOOK:
1. Machine Learning – Tom M. Mitchell, - MGH.

REFERENCE BOOK:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

WEBLINKS:

1. https://mllab.csa.iisc.ac.in.
2. https://studyglance.in/labprograms/mllabprograms.php

DEVOPS LAB (Professional Elective – III)

B. Tech. VI Semester **L T P C**
0 0 2 1

Subjects Code: 22CY633PL

Prerequisites: DEVOPS

Course Objectives:

1. Develop a sustainable infrastructure for applications and ensure high scalability. DevOps aims to shorten the software development lifecycle to provide continuous delivery with high quality.

Course Outcomes:

1. Understand the need for DevOps tools.
2. Understand the environment for software application development.
3. Apply different project management, integration, and development tools.
4. Use the Selenium tool for automated testing of applications.

List of Experiments:

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running a containerized application for exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above-containerized application using selenium.

TEXTBOOK:

1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wileypublications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. AddisonWesley.

MOBILE APPLICATION DEVELOPMENT LAB (Professional Elective – III)

B. Tech. VI Semester **L T P C**
0 0 2 1

Subjects Code: 22CY634PL

Prerequisites: A course on "Mobile Application Development".

Course Objectives:

1. To learn how to develop Applications in an Android environment.
2. To introduce Layout Management and multi-lay definition techniques to create an adaptable User Interface.
3. To know the user interface for mobile Applications using widgets with event handling.
4. To describe push notifications for incoming messages.
5. To explore applications to the Android marketplace for distribution.

Course Outcomes: After the completion of the course the student can able to:

1. Work with the Android operating system practically.
2. Configure the Android environment and use development tools.
3. Develop rich user Interfaces by using layouts and controls.
4. Implement User Interface components for Android application development.
5. Create Android applications using a database and publish them.

List of Experiments:

1. a) Create an Android application that shows Hello + the name of the user and run it on an emulator.
   (b) Create an application that takes the name from a text box and shows a hello message along with the name entered in the text box when the user clicks the OK button.
2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner), and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show a list on the left fragment and details on the right fragment instead of the second screen with the back button. Use Fragment transactions and the Rotation event listener.
4. Develop an application that uses a menu with 3 options for dialing a number, opening a website, and sending an SMS. On selecting an option, the appropriate action should be invoked using intents.
5. Develop an application that inserts some notifications into the Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
6. Create an application that uses a text file to store user names and passwords (tab-separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with the Login Failed message.
7. Create a user registration application that stores the user details in a database table.

8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.
9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.
10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number, etc.
11. Create an application that saves user information like name, age, gender, etc. in shared preference and retrieves them when the program restarts.
12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

TEXTBOOKS:

1. Reto Meier, Professional Android 4 Application Development, Wiley India, (Wrox), 2012.
2. James C Sheusi, Android Application Development for Java Programmers, Cengage, 2013.
3. Pradeep Kothari, Kogent Learning Solutions Inc., Android Application Development (With Kitkat Support), Black Book, Dreamtech Press, 2014.
4. Ashok Kumar R, Baskaran P, Mobile Application Development Laboratory, 2017.

REFERENCE BOOK:

1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley India (Wrox), 2013.
2. Michael Burton, Android App Development for Dummies, Wiley, Third edition, 2015.
3. Priyadharshini Ashokkumar, VTU-Mobile Application Development Lab Manual-18CSMP68: MAD Lab Manual(18CSMP68), 2021.

WEB LINKS:

1. https://www.udemy.com/course/mobile-application-development-using-android/
2. https://github.com/shubhaam13/Mobile-Application-Development
3. https://www.studocu.com/row/document/university-of-agriculture-faisalabad/mobile-application/mobile-application-development-lab/22189066
4. https://www.codingconnect.net/mobile-application-development-lab/
5. https://www.tutorialspoint.com/android
6. https://www.tutorialspoint.com/android/android_advanced_tutorial.pdf
7. https://developer.android.com

BLOCKCHAIN TECHNOLOGY LAB (Professional Elective – III)

B. Tech. VI Semester **L T P C**
0 0 2 1

Subjects Code: 22CY635PL

Prerequisites:

1. Knowledge in the Basics of JavaScript /Java for Hyperledger Fabric.
2. Basics of Solidity for ETH.

Course Objectives:

1. To learn the basic blockchain applications.
2. To be familiar with the blockchain lab setup.

Course Outcomes:

1. Able to work in the field of blockchain technologies.

List of Experiments

1. Setup Metamask in the System and Create a Wallet in the Metamask with Test Network.
2. Create multiple accounts in Metamask perform the balance transfer between theaccounts and describe the transaction specifications.
3. Set up the Ganache Tool in the system.
4. Create a custom RPC network in Metamask connect it with the Ganache tool and transfer theether between Ganache accounts.
5. Write a smart contract using a solidity program to perform the balance transfer from the contractto other accounts.
6. Write a solidity program to perform the exception handling.
7. Set up the Hyperledger Fabric Network with 2 Organizations 1 Peer Each in the system.
8. Create a channel called my channel, a car channel in the deployed network.
9. Take the existing Fabcar smart contract add a new function to query the car based on the person's name and deploy the smart contract on the Hyperledger Fabric Network.
10. Write an SDK program to query the person details from the deployed smart.

TEXTBOOK:

1. Michael Juntao Yuan, Building Blockchain Apps, Pearson.

REFERENCE BOOKS:

1. Asha A. George, Abhilasj K A and Meena Karthikeyan, Blockchain Technology, Chandramouli Subramanian, Universities Press.
2. Daniel Drescher, Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st ed. Edition

BIG DATA-SPARK

B. Tech. VI Semester

L	T	P	C
0	0	4	2

Subjects Code: 22CY606PC

Pre-requisites: SQL Commands, Basic Programming Languages.

Course Objectives:

1. The main objective of the course is to process Big Data with advanced architecture like Sparkand streaming data in Spark

Course Outcomes:

1. Develop MapReduce Programs to analyze large datasets Using Hadoop and Spark
2. Write Hive queries to analyze large datasets Outline the Spark Ecosystem and its components
3. Perform the filter, count, distinct, map, and flatMap RDD Operations in Spark.
4. Build Queries using Spark SQL
5. Apply Spark joins on Sample Data Sets
6. Make use of sqoop to import and export data from Hadoop to database and vice-versa

List of Experiments:

1. To Study of Big Data Analytics and Hadoop Architecture
   (i) know the concept of big data architecture
   (ii) know the concept of Hadoop architecture

2. Loading DataSet into HDFS for Spark Analysis Installation of Hadoop and cluster management
   (i) Installing a Hadoop single-node cluster in an Ubuntu environment
   (ii) Knowing the differencing between single-node clusters and multi-node clusters
   (iii) Accessing WEB-UI and the port number
   (iv) Installing and accessing environments such as Hive and scoop

3. File management tasks & Basic Linux commands
   (i) Creating a directory in HDFS
   (ii) Moving forth and back to directories
   (iii) Listing directory contents
   (iv) Uploading and downloading a file in HDFS
   (v) Checking the contents of the file
   (vi) Copying and moving files
   (vii) Copying and moving files between local to HDFS environment
   (viii) Removing files and paths
   (ix) Displaying a few lines of a file

(x) Display the aggregate length of a file
(xi) Checking the permissions of a file
(xii) Zipping and unzipping the files with & without permission and pasting them to a location
(xiii) Copy and paste commands

4. Map-reducing
   (i) Definition of Map-reduce
   (ii) Its stages and terminologies
   (iii) Word-count program to understand map-reduce (Mapper phase, Reducer phase, Drivercode)
5. Implementing Matrix-Multiplication with Hadoop Map-reduce

6. Compute the Average Salary and Total Salary by Gender for an Enterprise.

7. (i) Creating hive tables (External and internal)
   (ii) Loading data to external hive tables from SQL tables(or)Structured c.s.v using the scoop
   (iii) Performing operations like filtrations and updations
   (iv) Performing Join (inner, outer, etc.)
   (v) Writing User defined functions on hive tables

8. Create a SQL table of employees Employee table with id, designation Salary table (salary, dept id) Create an external table in hive with the similar schema of above tables, Move data to hive using scoop and load the contents into tables, filter a new table and write a UDF to encrypt the table with AES-algorithm, Decrypt it with key to show contents

9. (i) Pyspark Definition (Apache Pyspark) and difference between Pyspark, Scala, pandas
   (ii) Pyspark files and class methods
   (iii) get(file name)
   (iv) get root directory()

10. Pyspark -RDD'S
    (i) what is RDD's?
    (ii) ways to Create RDD
    (iii) parallelized collections
    (iv) external dataset
    (v) existing RDD's
    (vi) Spark RDD's operations (Count, foreach(), Collect, join,Cache()

11. Perform pyspark transformations
    (i) map and flatMap
    (ii) to remove the words, which are not necessary to analyze this text.

(iii) groupBy

(iv) What if we want to calculate how many times each word is coming into the corpus?

(v) How do I perform a task (say count the words 'spark' and 'apache' in rdd3) separately oneach partition and get the output of the task performed in these partitions?

(vi) unions of RDD

(vii) join two pairs of RDD Based on their key

12. Pyspark spark conf-Attributes and applications

(i) What is Pyspark spark conf ()

(ii) Using spark conf create a spark session to write a data frame to read details in a c.s.v andlater move that c.s.v to another location

TEXTBOOKS:

1. Spark in Action, Marko Bonaci and Petar Zecevic, Manning.
2. PySpark SQL Recipes: With HiveQL, Dataframe, and Graphframes, Raju Kumar Mishra and Sundar Rajan Raman, Apress Media.

WEB LINKS:

1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013301505844518912251 8 2_shared/overview
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01258388119638835242_s hared/overview
3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012605268423008256169 2 _shared/overview

ENVIRONMENTAL SCIENCE

B. Tech. VI Semester **L T P C**
3 0 0 0

Subjects Code: 22CH607MC

Prerequisites: NILL

Course Objectives:

1. To recognize the importance of the environment, self-sustain ecosystems.
2. To understand various natural resources – their importance, over exploitation, effects, and mitigation measures.
3. To create basic knowledge about different biotic resources and their need for conservation.
4. To be aware of the impacts of developmental activities and mitigation measures.
5. To know various environmental policies, legislation, and regulations.

Course Outcomes: After completion of this course, the students will be able to:

1. Explore the harmonious co-existence of nature and human beings.
2. Recognize conservation of natural resources particularly alternate sources of energy.
3. Evaluate and develop technologies for the conservation of biodiversity in a sustainable manner.
4. Generate ideas and implement technologies to solve environmental problems associated with air, water, and soil.
5. Develop technologies based on ecological principles and environmental regulations which help in sustainable development.

UNIT – I **[12 Lectures]**

Ecosystems: Definition, Scope, and Importance of Ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT – II **[10 Lectures]**

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.

Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT – III **[10 Lectures]**

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic, and optional values. India is a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity Act.

UNIT – IV **[9 Lectures]**

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water Pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards.

Solid waste: Municipal Solid Waste management, composition, and characteristics of e-waste and its management.

Pollution Control Technologies: Wastewater Treatment methods: Primary, secondary, and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on the human environment. Ozone depletion and Ozone-depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth Summit, Kyoto Protocol, and Montréal Protocol.

UNIT – V **[9 Lectures]**

Environmental Policy, Legislation & EIA: Environmental Protection Act, Legal aspects Air Act-1981, Water Act, Forest Act, Wildlife Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview of Impacts of air, water, biological, and Socio-economic aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept of Sustainable Development, Population, and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon lifestyle.

TEXTBOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

WEB LINKS:

1. https://onlinecourses.nptel.ac.in/noc23_hs155/preview
2. https://www.coursera.org/courses?query=environmental%20science
3. https://www.udemy.com/topic/environmental-science/
4. https://www.classcentral.com/subject/environmental-science
5. https://www.sciencedaily.com/news/earth_climate/environmental_science/

VULNERABILITY ASSESSMENT AND PENETRATION TESTING

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY701PC

Prerequisites:

1. Knowledge in information security.
2. Knowledge on Web Application.

Course Objectives

1. Give an introduction to Vulnerability Assessment and Penetration Testing.
2. To Study the Physical Penetration Attacks.
3. To be Familiar with the Penetration Testing and Tools.
4. To get an Exposure to Metasploit exploitation tool, Linux exploit and Windows exploit.
5. To gain knowledge on Web Application Security Vulnerabilities, Vulnerability analysis andMalware analysis.

Course Outcomes

1. Learn to handle the vulnerabilities of a Web application.
2. To understand the Physical Penetration Attacks.
3. Able to learn various penetration testing tools.
4. Knowledge on Metasploit, Linux exploit and windows exploit tools
5. Analyze various vulnerabilities

UNIT- I

Introduction: Ethics of Ethical Hacking-Understanding Enemy's Tactics, Recognizing Gray Areas in Security, Vulnerability Assessment and Penetration Testing, Ethical Hacking Process, Identify Unethical Hacker, Raise of Cyber Law.

Penetration Testing and Tools: Social Engineering Attacks-Types of Social Engineering Attacks, Working of Social Engineering Attack, Conducting Social Engineering Attack, Common Attacks Used in Penetration Testing- The Good Samaritan, Meeting, Preparing for Face-To-Face Attacks.

UNIT- II

Physical Penetration Attacks: Importance of Physical Penetration, Conducting A Physical Penetration- Reconnaissance, Mental Preparation, Common Ways into A Building-The Smokers' Door, Manned Checkpoints, Locked Doors, Physically Defeating Locks.

Insider Attacks: Conducting An Insider Attack-Tools and Preparation, Orientation, Gaining Local Administrator Privileges, Disabling Antivirus, Raising Cain, Defending Against Insider Attacks.

UNIT- III.

Managing a Penetration Test: Planning Penetration Test, Structuring Penetration Test, Execution of Penetration Test, Information Sharing During Penetration Test, Reporting Results of Penetration Test.

Windows Exploits: Compiling And Debugging Windows Programs, Writing Windows Exploits, Understanding Structured Exception Handling (SEH), Understanding Windows Memory Protections (XPSP3, Vista, 7 And Server 2008).

UNIT- IV

Web Application Security Vulnerabilities: An Overview of Top Web Application Security Vulnerabilities, Injection Vulnerabilities, Cross-Site Scripting Vulnerabilities, Cross-Site Scripting Vulnerabilities.

Vulnerability Analysis: Passive Analysis, Ethical Reverse Engineering, Source Code Analysis-Source Code Auditing Tools, The Utility of Source Code Auditing Tools, Manual Source Code Auditing, Automated Source Code Analysis, Binary Analysis - Manual Auditing of Binary Code.

UNIT- V

Client-Side Browser Exploits: Interesting in Client-side Vulnerabilities, Internet Explorer Security Concepts, History of Client-side Exploits and Latest Trends, Finding New Browser-based Vulnerabilities Heap Spray to Exploit.

Malware Analysis: Collecting Malware and Initial Analysis: Malware, Latest Trends in Honeynet Technology, Catching Malware: Setting the Trap, Initial Analysis of Malware- Static Analysis.

TEXT BOOKS:

1. "Gray Hat Hacking-The Ethical Hackers Handbook", Allen Harper, Stephen Sims, 3rd Edition, Tata Mc Graw-Hill.
2. "The Web Application Hacker's Handbook-Discovering and Exploiting Security flaws", Dafydd Suttard, Marcus pinto, 1st Edition, Wiley Publishing.

REFERENCE BOOKS:

1. "Penetration Testing: Hands-on Introduction to Hacking", Georgia Weidman, 1st Edition, NoStarch Press.
2. The Pen Tester Blueprint-Starting a Career as an Ethical Hacker", L. Wylie, Kim Crawly,1stEdition, Wiley Publications.

Web Links:

1. https://pages.cs.wisc.edu/~ace/media/gray-hat-hacking.pdf
2. https://www.cybrary.it/blog
3. https://www.breachlock.com/resources/blog
4. https://www.youtube.com/watch?v=lZAoFs75_cs
5. https://www.qualys.com/training/library/was/

NETWORK MANAGEMENT SYSTEMS AND OPERATIONS

B.Tech. VII Semester **L T P C**
3 0 0 3

Subjects Code: 22CY702PC

Prerequisites: NILL

Course Objectives:

1. Comprehensive understanding of network management.
2. Learn about network configurations, security policies, and risk assessments.
3. Learn about diagnosing and troubleshooting network faults, performance assessment, and optimization.
4. Learn about security network, management issues and security, management of wireless networks.
5. Learn about management tools and technologies, Network Planning tools.

Course Outcomes:

1. Understanding the challenges and structure of network management in the context of theInternet.
2. Defining network management and comprehending its scope, challenges, and variety in multi-vendor environments.
3. Identifying and diagnosing network faults, understanding trouble reports, and learningtroubleshooting techniques.
4. Exploring the various network management tools.
5. Understanding management tools and technologies.

UNIT - I

The Network Management Challenge: Introduction, The Internet and Network Management, InternetStructure, Managing an Entity, The state of Network Management, Network Management in the Gartner Model, The Lack of Industry Response, Distributed Systems and New Abstractions.

A Review of Network Elements and Services: Introduction, Network Devices and Network Services,Network Elements and Element Management.

UNIT - II

The Network Management Problem: Introduction, Definition of Network Management, The Scope of Network Management, Variety and Multi-Vendor Environments, Element and Network Management Systems, Scale and Complexity, Types of Networks, Classification of Devices.

Configuration And Operation: Introduction, Intuition for Configuration, Configuration and Protocol Layering, Dependencies Among Configuration Parameters, Seeking A More Precise Definition of Configuration.

UNIT - III

Fault Detection and Correction: Introduction, Network Faults, Trouble Reports, Symptoms, And Causes, Troubleshooting and Diagnostics, Monitoring, Baselines, Items That Can Be Monitored, Alarms,Logs, And Polling, Identifying the Cause of a Fault, Human Failure and Network Faults.

Performance Assessment and Optimization: Introduction, Aspects of Performance, Local and End-To-End Measurements, Passive Observation Vs. Active Probing, Bottlenecks and Future Planning, Capacity Planning.

UNIT - IV

Security: Introduction, Illusion of a Secure Network, Security as a process, Security Terminology and Concepts, Management goals related to Security, Risk Assessment, Security policies, Acceptable use policy, Basic Technologies used for Security, Management Issues and Security, Management of Wireless Networks, Security of the Network, Role-based Access Control, Audit trails and Security logging and Key Management.

UNIT - V

Management Tools and Technologies: Introduction, Principle of Most Recent change, The Evolution of Management Tools, Management Tools and Applications, using a separate network for Management, Types of management tools, Physical layer Testing tools, Reachability and Connectivity tools (ping), Packet analysis tools, Discovery tools, Device Interrogation interfaces and tools.

TEXT BOOK:

1. "Automated Network Management Systems", D. Comer, Prentice Hall, 2006, ISBN No.0132393085.

REFERENCE BOOKS:

1. "Nagios Core Administration Cookbook" - Second Edition, Tom Ryder, 2016, Packt Publishing,ISBN: 781785889332.
2. "Terraform: Up and Running", Yevgeniy Brikman, 2017, O'Reilly Media, Inc., ISBN:9781491977088
3. "Applied Network Security Monitoring", Chris Sanders, Jason Smith, Syngress publications.

Web Links:

1. https://www.cbtnuggets.com/it-training/cisco
2. https://www.pearsonhighered.com/assets/samplechapter/0/1/3/1/0131011138.pdf
3. https://www.youtube.com/watch?v=4fTOrb1yBFU
4. https://www.defendify.com/blog/the-cybersecurity
5. https://www.actitime.com/project-management/

EDGE ANALYTICS (Professional Elective – IV)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY741PE

Prerequisites:

- A basic knowledge of "Python Programming".

Course Objectives

1. Understand the fundamentals and importance of edge analytics in IoT.
2. The aim of the course is to introduce the fundamentals of Edge Analytics
3. The course gives an overview of Architectures, Components, Communication, Protocols and tools used for Edge Analytics
4. Implement edge analytics applications using Raspberry Pi and Micro Python.
5. Understand the integration of machine learning with edge analytics.

Course Outcomes

1. Understand the concepts of Edge Analytics, both in theory and in practical application
2. Demonstrate a comprehensive understanding of different tools used at edge analytics
3. Formulate, Design and Implement the solutions for real world edge analytics
4. Develop practical skills in designing and implementing edge analytics applications.
5. Ability to design and develop complete IoT solutions from concept to deployment.

UNIT- I

Introduction to Edge Analytics: Definition of edge analytics- Early Computers, Peer-to-Perr networks, cloud computing, Edge computing, Early IoT applications, Applying and comparing architectures- The standard IoT solution, Edge analytics-based IoT solution, Key benefits of edge analytics, Edge analytics architectures, Using edge analytics in the real world.

UNIT- II

Basic edge analytics components, connecting a sensor to the ESP-12F microcontroller, KOM-MICS smart factory platform, Communications protocols used in edge analytics, Wi-Fi communication for edge analytics, Bluetooth for edge analytics communication, Cellular technologies for edge analytics communication, Long-distance communication using LoRa and Signfox for edge analytics.

UNIT- III

Working with Microsoft Azure IoT Hub, Cloud Service providers, Microsoft Azure, Exploring the Azureportal, Azure IoT Hub, Using the Raspberry Pi with Azure IoT edge, connecting our Raspberry Pi edgedevice, adding a simulated temperature sensor to our edge device.

UNIT- IV

Using Micropython for Edge Analytics, Understanding Micropython, Exploring the hardware that runs MicroPython, Using MicroPython for an edge analytics application, Using edge intelligence with microcontrollers, Azure Machine Learning designer, Azure IoT edge custom vision.

UNIT- V

Designing a Smart Doorbell with Visual Recognition setting up the environment, Writing the edge code, creating the Node-RED dashboard, Types of attacks against our edge analytics applications, Protectingour edge analytics applications

Text Book:

1. Hands-On Edge Analytics with Azure IoT: Design and develop IoT applications with edgeanalytical solutions including Azure IoT Edge by Colin Dow

Reference Books:

1. Learn Edge Analytics - Fundamentals of Edge Analytics: Automated analytics at source usingMicrosoft Azure by Ashish Mahajan

Web Links:

1. https://www.youtube.com/watch?v=hmBe8WrG0LA
2. https://www.techtarget.com/searchdatacenter
3. https://www.youtube.com/watch?v=bNxjopXkhvk
4. https://www.youtube.com/watch?v=3373zE6aHas
5. https://www.youtube.com/watch?v=RRMSOlYW760

WEB & DATABASE SECURITY (Professional Elective – IV)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY742PE

Course Objectives

1. Give an Overview of information security
2. Give an overview of Access control of relational databases
3. To study the different models involved in database security and their applications in real time
4. To understand the fundamental concepts and advanced techniques in re-engineering database systems for enhanced security.
5. To understand future trends and challenges in maintaining privacy while sharing and publishing databases

Course Outcomes:

1. Understand the Web architecture and applications
2. Understand client side and server-side programming
3. Understand how common mistakes can be bypassed and exploit the application
4. Identify common application vulnerabilities
5. Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment

UNIT-I

The Web Security- The Web Security Problem, Risk Analysis and Best Practices, Cryptography and the Web- Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification: Passwords, Biometrics, and Digital Signatures- Physical Identification, Using Public Keys for Identification.

UNIT-II

The Web's War on Privacy- Understanding Privacy, user provided information, log files, understanding cookies, web bugs, Privacy-Protecting Techniques, Privacy-Protecting Technologies, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications, Securing Your Web Service.

UNIT-III

Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security for Workflow Systems, Security in Data Warehouses and OLAP Systems, Secure Semantic Web Services.

UNIT-IV

Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Database Watermarking: A Systematic View, . Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and

UNIT-V

Future Trends Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Privacy Protection through Anonymity in Location-based Services, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment

TEXT BOOKS:

1. "Web Security Privacy and Commerce", Simson GArfinkel, Gene Spafford, O'Reilly.
2. "Handbook on Database security applications and trends", Michael Gertz, Sushil Jajodia

REFERENCE BOOKS:

1. Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for ModernWeb Applications, O'reilly
2. Jonathan LeBlanc Tim Messerschmidt, Identity and Data Security for Web Development -Best Practices, O'reilly
3. McDonald Malcolm, Web Security For Developers, No Starch Press, US

WEB LINKS:

1. https://books.google.co.tz/books?id=KzabAgAAQBAJ&printsec=frontcover#v=onepage&q&f=false
2. https://www.zscaler.com/resources/security-terms-glossary/what-is-web-security
3. https://www.academia.edu/38743782/WEB_and_DATABASE_SECURITY_ATTACKS_and_CONTROL_METHODS
4. https://www.geeksforgeeks.org/database-security-best-practices/
5. https://www.ibm.com/topics/database-security
6. https://www.techtarget.com/searchsecurity/Data-security-guide-Everything-you-need-to-know

COMPUTER SYSTEM AUDIT AND ASSURANCE (Professional Elective – IV)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY743PE

Course Objectives:

1. Comprehensive understanding of network management.
2. Learn about network configurations, security policies, and risk assessments.
3. Learn about diagnosing and troubleshooting network faults, performance assessment, and optimization.
4. Learn about security network, management issues and security, management of wireless networks.
5. Learn about management tools and technologies, Network Planning tools, NOCs and remote monitoring.

Course Outcomes:

1. Understanding the challenges and structure of network management in the context of theInternet.
2. Defining network management and comprehending its scope, challenges, and variety in multi-vendor environments.
3. Identifying and diagnosing network faults, understanding trouble reports, and learningtroubleshooting techniques.
4. Exploring the various network management tools.
5. Understanding management tools and technologies

UNIT-I

System Audit and Assurance: Characteristics of Assurance Services: Definition and Scope of Assurance Services, Key Features and Objectives, Importance in Organizational Context, Types of Assurance services: Financial, Operational, Compliance and IT Assurance Services. Certified Information System Auditor, Benefits of Audits for Organization, COBIT.

UNIT-II

Internal Control and Information System Audit: Internal Control: Definition and Importance of Internal Control, Objectives and Components of Internal Control, Detective control: Role in Identifying and Correcting Errors or Irregularities, Implementation and Effectiveness of Detective Controls, Corrective Control, Computer-Assisted Audit Tools and Techniques.

UNIT-III

Conducting Information System Audit: Standard practices, policies, Audit planning, Risk Assessment, Information gathering techniques, Vulnerabilities, System security testing: Tools and Techniques for Security Testing, Conducting audits for Banks.

UNIT-IV

Audit Control: Network Security and Control, Internet Banking Risks and Control: Secure Transactions and Data Encryption, Regulatory Compliance for Internet Banking, Operating System Risks and Control, Operational Control Overview: Monitoring and Reviewing Operational Controls, Integrating Operational Controls with Overall Risk Management.

UNIT-V

Business Continuity and Disaster Recovery Planning: Data backup/storage: Types of Data Backup, Backup storage options, Developing appropriate Disaster recovery strategy: Technology Solutions for Disaster Recovery, Business Impact analysis: Risk Assessment and Impact Scenario.

TEXT BOOK:

1. Information System Audit and Assurance; D. P. Dube, Ved Prakash Gulati; Tata McGraw- HillEducation, 01-Jan2005

REFERENCE BOOKS:

1. William Stallings and Lawrie Brown, Computer Security: Principles and Practice, PearsonEducation.
2. Martin Weiss and Michael G. Solomon, Auditing IT Infrastructures For Compliance (Information Systems Security & Assurance), Jones and Bartlett Publishers, Inc.

Web Links:

1. https://www.coursera.org/learn
2. https://www.pluralsight.com/courses
3. https://www.academia.edu/36199523j
4. https://www.youtube.com/watch?v=o0xj1JKjjOE
5. https://www.youtube.com/watch?v=Gw8zXmg

SOCIAL MEDIA SECURITY (Professional Elective – IV)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY744PE

Course Objectives

1. Give introduction about the social networks, its use, the need of security in social data
2. Explain about Cybercrime, Fake sites, Defaced sites and hackers
3. Detail tell good Social media campaigns, Bad campaigns
4. Risk of social media and Social networks.
5. Explain about Social media policies and awareness of security and fake accounts

Course Outcomes

1. Learn about browser's risks
2. Learn about Social Networking,
3. Understand the risks while using social media.
4. Understand security of different web browsers.
5. Understand threats and safety measures involved using an email communication

UNIT – I

Introduction to Social Media, Understanding Social Media, Different Types and Classifications, The Value of Social Media, Cutting Edge Versus Bleeding Edge, The Problems That Come with Social Media, Security Issues, Challenges in Security (Taking Good with the Bad).

UNIT - II

The Dark side: The Dark side of social media, Cybercrime-Scams, Cyberstalking, Cyberbullying, Predators, Social Engineering- Dumpster diving, Phishing, Fake sites, hacked accounts- Example of how hacking works, Protecting, Defaced sites, keeping tracking of log information, Trusted Contacts,

UNIT – III

Being bold versus being overlooked: Good social media campaigns, Bad social media campaigns, better to be overlooked, social media hoaxes, the human factor- The OOPS factor, Netiquette, Don't feed the trolls, Content management- Stale and Outdated content, Content across different sites, Censor Ship, Promotion of social media-contests, Directories.

UNIT - IV

Risks of social media: Source of risk, public embarrassment- Removing videos from YouTube, removing photos and tags that other post on Facebook, removing post on Facebook, reporting abuse, Falseinformation- Misrepresenting, Misrepresenting business, Information leakage, Retention and archiving, Backing up social media, Loss of data and equipment.

UNIT – V

Policies and Privacy: Pros and Cons, Creating a Policy, Enforcing polices, Policies effected by social media, Privacy, blocking users: Blocking users- Blocking users on Facebook, Blocking users on Twitter, Blocking users on YouTube, blocking users on WordPress, Controlling app privacy-Checking the privacy apps before install, Removing apps and Blocking apps, Location awareness- Being aware of location.

TEXT BOOKS:

1. "Social Media Security" Leveraging Social Networking While Mitigating Risk, Michael Cross.

REFERENCE BOOKS:

1. Online Social Networks Security, Brij B. Gupta, Somya Ranjan Sahoo, Principles, Algorithm,Applications, and Perspectives, CRC press.
2. Interdisciplinary Impact Analysis of Privacy in Social Networks, Recognizing Your Digital Friends, Encryption for Peer-to-Peer Social Networks Crowd sourcing and Ethics, Authors: Altshuler Y, EloviciY, Cremers A.B, Aharony N, Pentland A. (Eds.).

Web Links:

1. https://books.google.co.in/books?id=cyzbAsm7FMYC&printsec=frontcover&redir_esc=y#v=onepage&q&f=false
2. https://www.ted.com
3. https://www.oreilly.com/library
4. https://www.youtube.com/watch?v=7UKObKBOn2s
5. https://www.youtube.com/watch?v=NrcxOU_NtFM

DEEP LEARNING (Professional Elective – IV)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY745PE

Pre-requisites:

1. A course on Artificial Intelligence
2. A course on Machine Learning

Course Objectives:

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning concepts
3. To gain knowledge to apply optimization strategies
4. To learn the concepts of Convolutional Networks
5. To learn various applications of Deep Learning methods.

Course Outcomes:

1. Understand the concepts of Neural Networks
2. Select the learning networks in modelling real-world systems
3. Apply optimization strategies for large scale applications
4. Use an efficient algorithm for Deep Models
5. Implement Deep learning models in various domains.

UNIT - I

Feedforward Networks: Definition of Feedforward Networks, Architecture of a Neural Network, Perceptron and Multilayer Perceptron's, Activation Functions.

Deep Feedforward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes.

UNIT - II

Regularization for Deep Learning:

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods.

UNIT - III

Optimization for Training Deep Models, How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies.

UNIT - IV

Convolutional Networks:

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong

Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuro-scientific Basis for Convolutional Networks, Convolutional Networks.

UNIT - V

Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data**,** Selecting Hyperparameters, Debugging Strategies.

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

TEXT BOOK:

1. Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning series), MIT Press.

REFERENCE BOOKS:

1. Li Deng and Dong Yu, Deep Learning Methods and Applications, Foundations and Trends® in Signal Processing Volume 7 Issues 3-4, ISSN: 1932-8346.

2. Dr. N.D. Lewis, Deep Learning Made Easy with R A Gentle Introduction for Data Science. Create Space Independent Publishing Platform (January 10, 2016).

3. François Chollet, JJ Allaire, MEAP Edition Manning Early Access Program Deep Learning with R Version 1, Copyright 2017 Manning Publications.

Web Links:

1. https://books.google.co.in/books?id=Np9SDQAAQBAJ&printsec=frontcover&redir_esc=y#v=onepage&q&f=false
2. https://www.youtube.com/watch?v=YeZn8J3IpcI
3. https://mit6874.github.io/assets
4. https://www.geeksforgeeks.org/computational-graphs-in-deep-learning
5. https://research.google/pubs/large-scale-deep-learning

QUANTUM COMPUTING (Professional Elective – V)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY751PE

Prerequisites: Familiarity with basic Linear algebra and Probability

Course Objectives

1. To introduce the fundamentals of quantum computing
2. The problem-solving approach using finite dimensional mathematics
3. To provide implication of quantum circuits
4. To explore various Quantum algorithms
5. To explore various Quantum Asymmetric algorithms and Quantum Computing on Cryptography

Course Outcomes

1. Analyze the behavior of basic quantum algorithms
2. Understand Basic Quantum Theory
3. Understand physical implementation of Qubit
4. Implement simple quantum algorithms and information channels in the quantum circuit model
5. Understand the Impact of Quantum Computing on Cryptography.

UNIT- I

Introduction and overview: History of Quantum Computation and Quantum Information, Quantum bits- Multiple qubits, Quantum computation- Single qubit gates, Multiple qubit gates, Quantum circuits, Qubit copying circuit, Quantum algorithms- Classical computations on a quantum computer.

Introduction to quantum mechanics: Linear algebra, the postulates of quantum mechanics, Application: superdense coding, The density operator, EPR and the Bell inequality.

UNIT- II

Introduction to computer science: Models for computation- Turing machines, Circuits, The analysis of computational problems- quantify computational resources, Computational complexity, Decision problems and the complexity classes P and NP, A plethora of complexity classes.

Quantum computation: Quantum circuits- Quantum algorithms, Single qubit operations, Controlled operations, Measurement, Universal quantum gates.

UNIT-III

The quantum Fourier transform and its applications: The quantum Fourier transform, Phase estimation- Performance and requirements. Applications- order-finding and factoring, General applications of the quantum Fourier transform- Period-finding, Discrete logarithms, The hidden subgroup problem, Other quantum algorithms.

UNIT-IV

Quantum search algorithms: The quantum search algorithm- The oracle, the procedure, Geometric visualization, Performance, Quantum search as a quantum simulation, Quantum counting, Optimality of the search algorithm, Black box algorithm limits.

Quantum computers: Physical realization: Guiding principles, Conditions for quantum computation- Representation of quantum information, Performance of unitary transformations, Preparation of fiducial initial states, Measurement of output result, Harmonic oscillator quantum computer.

UNIT-V

Quantum information: Quantum noise and quantum operations- Classical noise, Quantum operations- Environments and quantum operations, Operator-sum representation, Axiomatic approach to quantum operations, quantum noise and quantum operations- Trace and partial trace.

Distance measures for quantum information: Distance measures for classical information, Trace distance, Fidelity, Relationships between distance measures.

TEXT BOOK:

1. Quantum Computation and Quantum Information, Nielsen M. A, Cambridge.

REFERENCE BOOKS:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol.I: Basic Concepts, Vol II.
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to QuantumComputing Algorithms.

WEB LINKS:

1. https://www.pdfdrive.com/quantum-computation-and-quantum-information-10th-anniversary-edition-e161795544.html
2. https://code.iitm.ac.in/quantum-computing
3. https://www.youtube.com/watch?v=HaeJ8Q8TKxA
4. https://byjus.com/jee/pauli-exclusion-principle/
5. https://www.quantum-inspire.com/kbase/what-is-a-qubit/
6. https://www.youtube.com/watch?v=qyPo6u3nJik
7. https://www.youtube.com/watch?v=rCO2rMO9uqQ

DATA ANALYTICS FOR FRAUD DETECTION (Professional Elective – V)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY752PE

Prerequisites: NILL

Course Objectives

1. Discuss the overall process of how data analytics is applied
2. Discuss how data analytics can be used to better address and identify risks
3. Discuss how Data Analytical Tests is used in data analytic
4. Help to understand Data and Data familiarization steps
5. Help mitigate risks from fraud and waste for our clients and organizations

Course Outcomes

1. Formulate reasons for using data analysis to detect fraud.
2. Explain characteristics and components of the data and assess its completeness.
3. Identify known fraud symptoms and use digital analysis to identify unknown fraud symptoms.
4. Automate the detection process.
5. Verify results and understand how to prosecute fraud

UNIT - I

Introduction: Defining Fraud -Examples, Anomalies versus Fraud, Types of Fraud-Corruption, Asset misappropriation, Financial Statement Fraud, Assess the Risk of Fraud-Factors that determine risk assessment. Fraud Detection.

Defining Data Mining, Data Analysis, Data Analytics, Data Mining versus Data Analysis and Analytics, Data Analytical Software-Features, Anomalies versus Fraud within Data, Fraudulent Data Inclusions and Deletions

UNIT - II

The Data Analysis Cycle-Stages, Evaluation and Analysis-Software and Technology, Adult and Investigate. Obtaining Data Files-Adult Objectives, Determine whether IDEA is appropriate, Data requirement, Performing the Audit-Obtain text Files, IDEA Import, Documenting result, File Format Types, Preparation for Data Analysis, Arranging and Organizing Data Statistics and Sampling, Descriptive Statistics, Inferential Statistics

UNIT - III

Data Analytical Tests: Benford's Law, Using Benford's Law in IDEA, Usage consideration of Benford's Law, Number Duplication Test, Z-Score, Relative Size Factor Test, Same-Same-Same Test and Same-Same-Different Test-Purpose and Application.

UNIT - IV

Advanced Data Analytical Tests:

Defining Correlation, Correlation-Formulas for calculating r, Trend Analysis, GEL-1 and GEL-2-Purpose, Skimming and Cash Larceny-Case Study, Billing schemes and Data Familiarization, Benford's Law Tests, Relative Size Factor Test, Match Employee Address to Supplier data

UNIT - V

Payroll Fraud- Data and Data familiarization steps, Data analysis, The Payroll master and Commission tests. Expense Reimbursement Schemes- Type of Reimbursement, Data and Data Analysis. Register disbursement Schemes-False refunds and adjustments, False voids, Concealment, Data analytical tests.

TEXT BOOK:

1. "Fraud and Fraud Detection" A Data Analytics Approach by Sunder Gee, Wiley

REFERENCE BOOKS:

1. Blok Dyk Gerardus, Data analysis techniques for fraud detection, Create space IndependentPublishing Platform
2. Leonard W. Vona, Fraud Data Analytics Methodology: The Fraud Scenario Approach toUncovering Fraud in Core Business Systems, Wiley

Web Links:

1. https://www.pdfdrive.com/fraud-and-fraud-detection-website-a-data-analytics-approach-e174807676.html
2. https://www.youtube.com/watch?v=Pgb_uLGJanY
3. https://www.researchgate.net/publication
4. https://quiztudy.com/coursera-google-courses/google-advanced-data-analytics
5. https://www.lextegrity.com/resources

5G TECHNOLOGIES (Professional Elective – V)

B.Tech. VII Semester **L T P C**
3 0 0 3

Subjects Code: 22CY753PE

Prerequisites: COMPUTER NETWORKS

Course Objectives:

1. Knowledge on the concepts of 5G and 5G technology and drivers,
2. Understand 5G networkarchitecture, components, features and their benefits.
3. To be able to Understand the D2D Communication
4. Understand the Microwave Communication
5. To be able to Understand the Radio Wave Communication

Course Outcomes:

1. Understand 5G and 5G Broadband Wireless Communications
2. Understand 5G Uses and Architecture
3. Analyze Device-to-device (D2D) communications
4. Learn Massive MIMO propagation channel models
5. Understand the significance of radio access technologies for 5G

UNIT - I

Overview of 5G Broadband Wireless Communications: Historical Background, Industrial and technological revolution: from steam engines to the Internet, Mobile communications generations: from 1G to 4G, Rationale of 5G, mobile broadband (MBB) to extreme MBB, IoT: relation to 5G, Standardization activities- ITU-R, 3GPP, IEEE

UNIT – II

5G Use Cases and System Concepts: Use Case and Requirements- Use Case, Requirements and key performance indicators, 5G system concepts- Extreme Mobile broadband, Massive Machine type communication, ultra-reliable machine type communication, Dynamic Radio Access Network.

The 5G architecture:

Introduction-NFV and SDN 50, Basics about RAN architecture, High-level requirements for the 5G architecture, Functional architecture and 5G flexibility- Functional split criteria, Functional split alternatives, Functional optimization for specific applications.

UNIT – III

Device-to-Device (D2D) Communications– D2D standardization: 4G LTE D2D, D2D in 5G: research challenges, radio resourcemanagement for mobile broadband D2D- RRM techniques for mobile broadband D2D, RRM and system design for D2D, 5G D2D RRM concept, multi-hop and multi-operator D2D communications- National security and public safety requirements in 3GPP and METIS, Device discovery without and with network assistance.

UNIT – IV

Millimeter-wave Communications, Spectrum and Regulations, Hardware technologies for mmW systems- Device technology, Antennas, Beamforming architecture, Deployment scenarios, Beam-forming- Beamforming techniques, Beam finding, physical layer techniques- Duplex scheme, Transmission schemes.

Massive multiple-input multiple-output (MIMO) systems- MIMO in LTE, Single user MIMO, Pilot design for Massive MIMO, Resource allocation and transceiver algorithms for massive MIMO, Fundamentals of baseband and RF implementations in massive MIMO.

UNIT – V

The 5G radio-access technologies: Access design principles for multi-user communications — Orthogonal Frequency Division Multiplexing (OFDM), Filter Bank Multi-Carriers (FBMC) and Universal Filtered Multi-Carrier (UFMC), Multiple Access Techniques – Orthogonal Frequency Division Multiple Accesses (OFDMA), Non-Orthogonal Multiple Accesses (NOMA).

TEXT BOOKS:

1. Afif Osseiran, Jose.F. Monserrat, Patrick Marsch, "Fundamentals of 5G Mobile Networks", Cambridge University Press.

REFERENCE BOOKS:

1. Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", John Wiley & Sons.
2. Amitabha Ghosh and Rapeepat Ratasuk "Essentials of LTE and LTE-A", Cambridge University Press
3. Athanasios G.Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos, "New Directions in Wireless Communication Systems from Mobile to 5G", CRC Press.
4. Theodore S. Rappaport, Robert W. Heath, Robert C. Danials, James N. Murdock "MillimeterWave Wireless Communications", Prentice Hall Communications.
5. Martin Sauter "From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to MobileNetworks and Mobile Broadband", Wiley-Blackwell.

Web Links:

1. https://www.pdfdrive.com/5g-mobile-and-wireless-communications-technology-e185269386.html
2. https://wides.usc.edu/research.html
3. https://www.researchgate.net/publication/303718730
4. https://en.wikipedia.org/wiki/Device-to-device
5. https://archive.nptel.ac.in/courses/117/105/117105139/

SECURITY INCIDENT AND RESPONSE MANAGEMENT (Professional Elective – V)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY754PE

Prerequisites:

- Knowledge of information security and applied cryptography.
- Knowledge of Operating Systems.

Course Objectives:

1. Give an introduction to the preparation of inevitable incidents, incident detection and characterization.
2. To get exposure to live data collection and forensic duplication.
3. To gain knowledge on network monitoring systems and enterprises services.
4. To learn data analysis and file systems.
5. To gain knowledge on data collection in Windows and Mac OS Systems.

Course Outcomes:

1. Learn how to handle the incident response management.
2. Perform live data collection and forensic duplication.
3. Identify network evidence and enterprise services.
4. Analyze data to carry out an investigation.
5. Knowledge on investigation on Mac and Windows OS systems

UNIT-I

Introduction: Preparing for the inevitable incident: Real-world incident, IR management incident and book, Pre-incident preparation- preparing the Organization for Incident Response, Preparing the IR team, preparing the Infrastructure for Incident Response.

Incident Detection and Characterization: Getting the investigation started on the right foot-collecting initial facts, Maintenance of Case Notes, Understanding Investigative Priorities.

Discovering the scope of Incident: Examining initial data, Gathering and reviewing preliminary evidence, determining a course of action, Customer data loss scenario, automated clearing fraud scenario.

UNIT-II

Data Collection: Live Data Collection: Perform live response, selecting a live response tool, what to collect, collection best practices, Live data collection on Microsoft Windows Systems, Live Data Collection on Unix- based Systems.

Forensic Duplication: Forensic Image Formats, Traditional duplication, live system duplication, Duplication of Enterprise Assets.

UNIT-III

Network Evidence: The case for network monitoring, Types for network Monitoring-Event-Based Alert Monitoring, Header and Full Packet Logging, Statistical Modeling. setting up a Network Monitoring System-Installation of a Pre-Built Distribution, Deploying the Network Sensor, Collect Logs Generated from Network Events.

Enterprise Services: Network Infrastructure Services, Enterprise Management Applications, Web servers, Database Servers.

UNIT-IV

Data Analysis: Analysis Methodology- Define Objectives, know your data, Access your data, analyze your data, Evaluate Results.

Investigating Windows Systems: NTFS and File System analysis- The Master File Table, INDX Attributes, Change Logs, Volume Shadow Copies, File System Redirector. Prefetch, Event logs, Scheduled Tasks, The Windows Registry, Other Artifacts of Interactive Sessions.

UNIT-V

Investigating Mac OS X Systems: HFS and File System Analysis- Volume Layout, File System Services, Core Operating Systems Data-File System Layout, User and Service Configuration, Trash and Deleted Files.

Investigating Applications: Application Data, Application data stored, General Investigation methods, Web Browser, Email Clients, Instant Message Clients.

TEXT BOOK:

1. "Incident Response and Computer Forensics", Jason T. Luttgens, Mathew Pepe and KevinMandia, 3rd Edition, Tata McGraw-Hill Education.

REFERENCE BOOKS:

1. "Cyber Security Incident Response-How to Contain, Eradicate, and Recover from Incidents",Eric. C. Thompson, Apress.
2. "The Computer Incident Response Planning Handbook: Executable Plans for ProtectingInformation at Risk", N.K. McCarthy, Tata McGraw-Hill.

Web Links:

1. https://www.pdfdrive.com/incident-response-computer-forensics-3rd-edition-e60282743.html
2. https://www.pluralsight.com/courses
3. https://study.com/academy/lesson/digital-forensic-imaging-types-examples.html
4. https://docs.microfocus.com/doc/ESM/SaaS/NetworkInfra
5. https://www.udemy.com/course
6. https://www.oreilly.com/library/view/incident-response/9780071798686/ch13.html

AUTHENTICATION TECHNIQUES (Professional Elective – V)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY755PE

- **Prerequisites:** Knowledge of Continuous authentication, Digest based authentication,

Course Objectives:

1. Knowledge on concept of authentication types and Protocols and Tokens.
2. To Know physical identification and various key agreement Protocols.
3. To Know the Biometrics Techniques and Matching Patterns.
4. To Know Local authentication and Authentication by address and Authenticating a Geographical Location.
5. To know the Indirect Authentication network boundary control and Attacks on channels.

Course Outcomes:

1. Understand different types of authentication techniques.
2. Understand authentication and Key Transport using Key Cryptography.
3. Understand different biometric techniques used in authentication.
4. Understand the procedure of local authentication and Authentication by Addresses.
5. Apply various authentication protocols in different environments and their representation.

UNIT - I:

Introduction to Authentication: Definition of Authentication, Identification/verification, Stages and steps of authentication, Protocol Architectures, Cryptographic tools, Adversary capabilities, Goals for authentication and key establishment.

Authentication Tokens: Tokens, Network Password Sniffing, One-Time Passwords, Man in the middle Attack, IP Hijacking, incorporating a PIN, Enrolling Users

UNIT - II:

Authentication and Key Transport Using Public Key Cryptography: Physical identification using Entity Authentication Protocols: Protocols in ISO/IEC 9798-3, Protocols in ISO/IEC 9798-5, SPLICE/AS, Key Transport Protocols**.**

Key Agreement Protocols: Introduction, Diffie-Hellman Key Agreement, MTI Protocols, Diffie-Hellman based protocols with Basic Message Format, Diffie-Hellman based protocols with explicit authentication**.**

UNIT - III:

Biometrics: Biometrics, Uses of Biometrics, Biometric Techniques, The Biometrics Work, taking a Biometric Reading, Feedback During Biometric Input, forging a Physical Trait, Building and Matching Patterns, A Trivial Hand Geometry Biometric, Enrolling a User.

UNIT - IV:

Local Authentication: Laptops and Workstations, Workstation Encryption, File Encryption, Volume Encryption, Encryption for Data Protection, Shortcut Attacks on Encryption, Trial-and-Error Attacks onEncryption, Theoretical Guess-Rate Limitations, Key-Handling Issues, Key-Handling Policies, Key Escrow and Crypto Politics.

Authentication by Address: Telephone Numbers as Addresses, Identification via Dial-Back, Dial-Up Identification: Caller ID, Network Addresses, Denial of Service Attacks, Effective Source Authentication, Unix Local Network Authentication.

UNIT - V:

Indirect Authentication: Indirect Authentication, Network Boundary Control, One-Time Password Products, LAN Resource Control, RADIUS Protocol, Protecting RADIUS Messages, RADIUS Challenge Response, Encrypted Connections and Windows NT, Encrypted Connections, Integrity Protection, Politics, Encryption, and Technical Choices.

TEXT BOOKS:

1. "Protocols for Authentication and Key Establishment", Colin Boyd and Anish Mathuria, springer, 202.
2. "Authentication: From Passwords to Public Keys", Smith, R. E. (2002), UnitedKingdom: Addison-Wesley.

REFERENCE BOOKS:

1. Biometrics Authentication: A Practical Guide to Fingerprint, Face, Iris, and Speech Recognitionby Anil Jain, Arun Ross, and Karthik Nandakumar
2. Kerberos: The Protocol and Its Applications by William Stallings
3. Biometrics Technologies and verification Systems, John Vacca, , Elsevier Inc. , 2007.
4. Pattern Classification, Richard O. Duda, David G.Stork, Peter E. Hart, Wiley 2007.

Web Links:

1. https://books.google.je/books?id=EEmqCAAAQBAJ&printsec=frontcover#v=onepage&q&f=false
2. https://www.geeksforgeeks.org
3. https://www.tutorialspoint.com/biometrics/biometrics_tutorial.pdf
4. https://www.youtube.com/watch?v=j8Yxff6L_po
5. https://support.kemptechnologies.com/hc/en-us/articles/5702007816333

COMPUTER SECURITY & AUDIT ASSURANCE (Open Elective – II)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY721OE

Prerequisites

Course Objectives:

6. Comprehensive understanding of network management.
7. Learn about network configurations, security policies, and risk assessments.
8. Learn about diagnosing and troubleshooting network faults, performance assessment, and optimization.
9. Learn about security network, management issues and security, management of wireless networks.
10. Learn about management tools and technologies, Network Planning tools, NOCs and remote monitoring.

Course Outcomes:

1. Understanding the challenges and structure of network management in the context of theInternet.
2. Defining network management and comprehending its scope, challenges, and variety in multi-vendor environments.
3. Identifying and diagnosing network faults, understanding trouble reports, and learningtroubleshooting techniques.
4. Exploring the various network management tools.
5. Understanding management tools and technologies

UNIT-I

System Audit and Assurance: Characteristics of Assurance services: Definition and Scope of Assurance Services, Key Features and Objectives, Importance in Organizational Context, Types of Assurance services: Financial, Operational, Compliance and IT Assurance Services. Certified Information system auditor, Benefits of Audits for Organization, COBIT.

UNIT-II

Internal Control and Information System Audit: Internal Control: Definition and Importance of Internal Control, Objectives and Components of Internal Control, Detective control: Role in Identifying and Correcting Errors or Irregularities, Implementation and Effectiveness of Detective Controls, Corrective Control, Computer-Assisted Audit Tools and Techniques.

UNIT-III

Conducting Information System Audit: Standard practices, policies, Audit planning, Risk Assessment, Information gathering techniques, Vulnerabilities, System security testing: Tools and Techniques for Security Testing, Conducting audits for Banks.

UNIT-IV

Audit Control: Network Security and Control, Internet Banking Risks and Control: Secure Transactions and Data Encryption, Regulatory Compliance for Internet Banking, Operating System Risks and Control, Operational Control Overview: Monitoring and Reviewing Operational Controls, Integrating Operational Controls with Overall Risk Management.

UNIT-V

Business Continuity and Disaster Recovery Planning: Data backup/storage: Types of Data Backup, Backup storage options, Developing appropriate Disaster recovery strategy: Technology Solutions for Disaster Recovery, Business Impact analysis: Risk Assessment and Impact Scenario.

TEXT BOOK:

1. Information System Audit and Assurance; D. P. Dube, Ved Prakash Gulati; Tata McGraw- HillEducation, 01-Jan2005

REFERENCE BOOKS:

1. William Stallings and Lawrie Brown, Computer Security: Principles and Practice, PearsonEducation.
2. Martin Weiss and Michael G. Solomon, Auditing IT Infrastructures For Compliance (Information Systems Security & Assurance), Jones and Bartlett Publishers, Inc.

Web Links:

1 https://www.coursera.org/learn
2 https://www.pluralsight.com/courses
3 https://www.academia.edu/36199523j
4 https://www.youtube.com/watch?v=o0xj1JKjjOE
5 https://www.youtube.com/watch?v=Gw8zXmg

SOCIAL MEDIA SECURITY (Open Elective – II)

B.Tech. VII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY722OE

Prerequisites: Nill

Course Objectives

1. Give introduction about the social networks, its use, the need of security in social data
2. Explain about Cybercrime, Fake sites, Defaced sites and hackers
3. Detail tell good Social media campaigns, Bad campaigns
4. Risk of social media and Social networks.
5. Explain about Social media policies and awareness of security and fake accounts

Course Outcomes

1. Learn about browser's risks
2. Learn about Social Networking,
3. Understand the risks while using social media.
4. Understand security of different web browsers.
5. Understand threats and safety measures involved using an email communication

UNIT – I

Introduction to Social Media, Understanding Social Media, Different Types and Classifications, The Value of Social Media, Cutting Edge Versus Bleeding Edge, The Problems That Come with Social Media, Security Issues, Challenges in Security (Taking Good with the Bad).

UNIT - II

The Dark side: The Dark side of Social Media, Cybercrime-Scams, Cyberstalking, Cyberbullying, Predators, Social Engineering- Dumpster diving, Phishing, Fake sites, hacked accounts- Example of how hacking works, Protecting, Defaced sites, keeping tracking of log information, Trusted Contacts,

UNIT – III

Being bold versus being overlooked: Good social media campaigns, Bad social media campaigns, better to be overlooked, social media hoaxes, the human factor- The OOPS factor, Netiquette, Don't feed the trolls, Content management- Stale and Outdated content, Content across different sites, Censor Ship, Promotion of social media-contests, Directories.

UNIT - IV

Risks of social media: Source of risk, Public embarrassment- Removing videos from YouTube, removing photos and tags that other post on Facebook, removing post on Facebook, reporting abuse, Falseinformation- Misrepresenting, Misrepresenting business, Information leakage, Retention and archiving, Backing up social media, Loss of data and equipment.

UNIT – V

Policies and Privacy: Pros and Cons, creating a policy, enforcing polices, policies effected by social media, Privacy, blocking users: Blocking users- Blocking users on Facebook, blocking users on twitter, blocking users on YouTube, blocking users on WordPress, Controlling app privacy-Checking the privacy apps before install, removing apps and Blocking apps, Location awareness- Being aware of location.

TEXT BOOKS:

1. "Social Media Security" Leveraging Social Networking While Mitigating Risk, Michael Cross.

REFERENCE BOOKS:

1. Online Social Networks Security, Brij B. Gupta, Somya Ranjan Sahoo, Principles, Algorithm,Applications, and Perspectives, CRC press.
2. Interdisciplinary Impact Analysis of Privacy in Social Networks, Recognizing Your Digital Friends, Encryption for Peer-to-Peer Social Networks Crowd sourcing and Ethics, Authors: Altshuler Y, EloviciY, Cremers A.B, Aharony N, Pentland A. (Eds.).

Web Links:

1. https://books.google.co.in/books?id=cyzbAsm7FMYC&printsec=frontcover&redir_esc=y#v=onepage&q&f=false
2. https://www.ted.com
3. https://www.oreilly.com/library
4. https://www.youtube.com/watch?v=7UKObKBOn2s
5. https://www.youtube.com/watch?v=NrcxOU_NtFM

VULNERABILITY ASSESSMENT & PENETRATION TESTING LAB

B.Tech. VII Semester	L	T	P	C
	0	0	2	1

Subjects Code: 22CY703PC

Prerequisites

Course Objectives:

- Learning Penetration Testing methodologies
- Monitoring the network traffic
- To understand the host and services discovery

Course Outcomes:

- Design for monitoring network traffic.
- Perform different penetration testing methods.
- Design different types of vulnerabilities scanning.
- Understand web application assessment.

List of Experiments:

1. Implement Monitoring of Network Traffic using
    a. wireshark
    b. tcpdump
    c. Nagios
    d. solarwinds
2. Implement Host & Services Discovery using Nmap, massscan.
3. Implement Vulnerability Scanning using OpenVAS, Zapproxy, SQLmap.
4. Implement Internal Penetration Testing.
    a. Mapping
    b. Scanning
    c. Gaining access through CVE's
    d. Sniffing POP3/FTP/Telnet Passwords
    e. ARP Poisoning
    f. DNS Poisoning
5. Implement External Penetration Testing.
    a. Evaluating external Infrastructure.
    b. Creating topological map & identifying IP address of target.
    c. Lookup domain registry for IP information.
    d. Examining use of IPV6 at remote location.
6. Implement Vulnerability scanning with Nessus.
7. Implement Vulnerability scanning with openvas.

8. Implement Web application assessment with nikto.
9. Implement Web application assessment with burp suite.
10. Implement Web application assessment with owaspzap,

TEXT BOOKS:

1. " Gray Hat Hacking-The Ethical Hackers Handbook", Allen Harper, Stephen Sims, MichaelBaucom, 3rd Edition, Tata Mc Graw-Hill.
2. " The Web Application Hacker's Handbook-Discovering and Exploiting Security flaws", DafyddSuttard, Marcus pinto, 1st Edition, Wiley Publishing.

REFERENCE BOOKS:

1. "Penetration Testing: Hands-on Introduction to Hacking", Georgia Weidman, 1st Edition, NoStarch Press.
2. " The Pen Tester Blueprint-Starting a Career as an Ethical Hacker ", L. Wylie, Kim Crawly, 1stEdition, Wiley Publications.

Web Links:

1. https://www.teramind.co/blog/ways-to-monitor-network-traffic/
2. https://www.youtube.com/watch?v=NtPcoDtetvk
3. https://www.youtube.com/watch?v=lReXcE9BT0g
4. https://www.youtube.com/watch?v=CktYFft7K8Q
5. https://www.tenable.com/blog/how-to-run-your-first-vulnerability-scan-with-nessus

NETWORK MANAGEMENT SYSTEMS AND OPERATIONS LAB

B.Tech. VII Semester

L	T	P	C
0	0	2	1

Subjects Code: 22CY704PC

Prerequisites

Course Objectives:

- Comprehensive understanding of network management.
- Learn about network configurations, security policies, and risk assessments.
- Learn about diagnosing and troubleshooting network faults, performance assessment, andoptimization.

Course Outcomes:

- Understanding the challenges and structure of network management in the context of theInternet.
- Defining network management and comprehending its scope, challenges, and variety in multi-vendor environments.
- Identifying and diagnosing network faults, understanding trouble reports, and learning troubleshooting techniques.
- Exploring the various network management tools.

List of Experiments:

1. Network Discovery and Mapping
   A. Utilize tools like Nmap and Wireshark to perform network discovery.
   B. Create a visual map of the network infrastructure.
   C. Analyze the implications of the network structure on management strategies.

2. Policy Implementation and Compliance
   A. Use tools like Snort or Suricata for intrusion detection.
   B. Implement firewall rules with tools such as iptables or pfSense.
   C. Assess compliance with security policies and regulatory requirements.

3. Automation with Ansible
   A. Set up Ansible for network configuration management.
   B. Automate routine tasks such as software updates and configuration changes.
   C. Evaluate the impact of automation on efficiency and responsiveness.
4. Fault Detection with Wireshark and Nagios
5. Protocol Analysis with Tcpdump
6. Traffic Analysis with Wireshark and Bandwidthd
7. Traffic Measurement with Ntopng

8. Threat Modeling with OWASP Cornucopia
9. Risk Assessment with OpenVAS
10. Firewall Configuration with pfSense
11. Network Discovery with Nmap
12. Security Enforcement with Snort

TEXT BOOK:

1. Automated Network Management Systems, D. Comer, Prentice Hall, 2006, ISBN No.0132393085.

REFERENCE BOOKS:

1. Nagios Core Administration Cookbook - Second Edition, Tom Ryder, 2016, Packt Publishing,ISBN: 781785889332.
2. Terraform: Up and Running, Yevgeniy Brikman, 2017, O'Reilly Media, Inc., ISBN:9781491977088

Web links

1. https://www.solarwinds.com
2. https://www.youtube.com/watch?v=q5oZwhnFgQo
3. https://www.youtube.com/watch?v=s5n0j2Nq27I
4. https://www.youtube.com/watch?v=zbzV9-QGiQY
5. https://www.cybrary.it/blog/

ORGANIZATIONAL BEHAVIOUR

B.Tech. VIII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22MB801HS

Prerequisites: NILL

Course Objectives:

1. Understand how organizational behaviour can improve productivity,
2. Understand learning theories and processes.
3. Understand the importance of team building, interpersonal relations, communication within groups.
4. Understand the importance of leadership and various leadership styles.
5. Understand stress, its work stressors, and methods for managing stress.

Course Outcomes:

1. Students will be able to define Organizational Behavior and explain its importance in productivity.
2. Students will be able to explain emotions, emotional labor, and emotional intelligence.
3. Students will be able to apply various group decision-making techniques.
4. Students will gain insight into various sources of power.
5. Students will understand organizational culture and climate.

UNIT - I Organizational Behavior

Definition, Need and importance of organizational behaviors: Improved Productivity, Employee satisfaction, Organizational Adaption – Nature and scope – Frame work – Organizational behaviors models: Autocratic, Custodial, Supportive, Collegial, System Models.

UNIT - II Individual Behaviors

Personality – types – Factors influencing personality – Theories – Learning – Types of learners – Thelearning process – Learning theories – Organizational behaviors modification, Misbehaviors – Types – Management Intervention. Emotions - Emotional Labor – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values, Types – Effects on work behavior.

UNIT - III Group Behaviors

Organization structure: Definition, Types, Components – Formation – Groups in organizations – Influence – Group dynamics: Roles, Norms, Status, Cohesiveness – Emergence of informal leaders and working norms – Group Decision Making Techniques: Brainstorming, Multi Voting– Team building - Interpersonal relations – Communication – Control.

UNIT - IV Leadership and Power

Meaning – Importance – Leadership styles: Autocratic, Democratic, Laissez-Faire, Transformational, Transactional, Situational – Theories of Leadership: Trait, Behavioral, Contingency, Path-Goal theories – Leaders Vs Managers – Sources of power: Legitimate, Reward, Coercive, Expert, Referent, Informational powers – Power centers – Power and Politics: Organizational Politics, Managing Politics.

UNIT - V Dynamics of Organizational Behaviors

Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life.

TEXT BOOKS:

1. Stephen P. Robins, Organizational Behavior, PHI Learning / Pearson Education, 11th edition,2008.
2. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001.

REFERENCE BOOKS:

1. Schermerhorn, Hunt and Osborn, Organizational behavior, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding Organizational Behaviors, 2nd Edition, Oxford Higher Education,2004.

WEB-LINKS:

1. https://openstax.org/details/books/organizational-behavior/
2. https://open.umn.edu/opentextbooks/textbooks/30
3. https://www.coursera.org/courses?query=organizational%20behavior
4. https://www.javatpoint.com/what-is-quantum-computing
5. https://engineering.purdue.edu/online/courses/quantum-computing-i

QUANTUM CRYPTOGRAPHY (Professional Elective – VI)

B.Tech. VIII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY861PE

Prerequisites: Quantum computing

Course Objectives

1. To understand the fundamental principles of quantum information theory.
2. To study the characteristics of quantum channels and their interaction.
3. To investigate various attack strategies on QKD protocols.
4. To explore the transition from prototype quantum-cryptographic networks.
5. To study the Ring of Trust model, its communication protocols.

Course Outcomes

1. Students will understand the fundamental concepts of quantum information theory.
2. Students will gain insight into the characteristics of quantum channels.
3. Students will learn about various error correction techniques.
4. Students will be skilled in using statistical methods to analyze QKD networks.
5. Students will understand the Ring of Trust model and its application.

UNIT - I

Quantum Information Theory: Quantum States, Quantum Operations, Generalized Measurements, Unconditional Secure Authentication: Definition, Model, Constructions, Entropy, Quantum Key Distribution: Cryptography, Information and communication theory, Digital signal processing, Quantum information, Coherent states, Quantum Channel, Public Channel, QKD Gain, Finite Resources

UNIT - II

Adaptive Cascade Introduction: Definition, Control System, Parametric Frame work, Error Correction and the Cascade Protocol: Cascade as Client-Server, Input and Output of Cascade Protocol, Cascade Iterations, Key Shuffling, Adaptive Initial Block-Size Selection, Fixed Initial Block-Size, Dynamic Initial Block-Size, Examples

UNIT - III

Attack Strategies on QKD Protocols: Introduction, Attack Strategies in an Ideal Environment: Frontal attack, Flanking attack, Encirclement, Bypass attack, Guerrilla attack, Individual Attacks in a Realistic Environment: Planning, Assessment, Executing attack scenarios, QKD Systems: Introduction, QKD Systems, Center Network Controller, Node Control, QKD Modules.

UNIT - IV

Statistical Analysis of QKD Networks in Real-Life Environment: Statistical Methods, Results of the Experiments, Statistical Analysis, QKD Networks Based on Q3P: QKD Networks: Architecture, Interfaces and Protocols, associated layers, PPP(Public Private Partnership), Q3P(Quantum Point-to-Point Protocol), Routing: Distance Vector Routing Protocol, Link State Routing Protocol, Advanced Distance Vector Protocol, Transport

UNIT - V

Quantum-Cryptographic Networks from a Prototype to the Citizen: The SECOQC Project, Bringing QKD into the "Real" Life, Resumee, The Ring of Trust Model: Introduction, Model of the Point of Trust Architecture, Communication in the Point of Trust Model, Exemplified Communications, A Medical Information System Based on the Ring of Trust.

TEXT BOOK:

1. Kollmitzer C., Pivk M. (Eds.), Applied Quantum Cryptography, Lect. Notes Phys. 797 (Springer, Berlin Heidelberg 2010).

REFERENCE BOOKS:

1. Gerald B. Gilbert, Michael Hamrick, and Yaakov S. Weinstein, Quantum Cryptography, World Scientific Publishing.
2. Gilles Van Assche, Quantum Cryptography and Secret-Key Distillation, Cambridge University Press.

WEB-LINKS:

1. https://www.udemy.com/courses/search/?src=ukw&q=QUANTUM+CRYPTOGRAPHY
2. https://www.javatpoint.com/encryption-algorithms-in-cryptography
3. https://research.ibm.com/quantum-computing
4. https://www.technologyreview.com/2023/01/06/1066317/whats-next-for-quantum-computing/
5. https://dev.to/balapriya/useful-resources-to-learn-quantum-computing-414k

IOT CLOUD PROCESSING AND ANALYTICS (Professional Elective – VI)

B.Tech. VIII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY862PE

Prerequisites: Programming experience in C, Java or Python (one of the three) is required.

Course Objectives

1. Understanding IoT Data Characteristics: volume, velocity, variety, and veracity.
2. Understanding Data Flow and Cloud Connectivity to the cloud in specific format.
3. To learn Big Data Processing Tools for IoT data in distributed computing environments.
4. To learn Analytics Algorithms to extract intelligence from IoT data.
5. Understanding of tools and techniques for IoT semantics and data streaming analytics.

Course Outcomes

1. Students learn about the unique characteristics of data generated by IoT devices.
2. Students explore how to build data flows that connect IoT systems or device.
3. Students learn concepts related to distributed data processing, storage, and analytics.
4. Students gain knowledge of algorithms for analyzing IoT patterns.
5. Students learn to analyze and implement strategies for auto scaling and dynamic work rebalancing in IoT environments.

UNIT - I

Introducing IoT Analytics

IoT Data and BigData, Challenges of IoT Analytics, Applications, IoT Analytics Lifecycle and Techniques IoT

Cloud and Big Data Integration for IoT Analytics

Introduction, IaaS, PaaS and SaaS Paradigms, Requirements of IoT Big Data Analytics, Platform 3, Functional Architecture, Data Analytics for the IoT, Data Collection Using Low-power, Long-range Radios, WAZIUP Software Platform, iKaaS Software Platform

UNIT - II

Searching the Internet of Things

Introduction, A Search Architecture for Social and Physical Sensors: data collection, processing, indexing and querying, and the integration of social and physical sensors, Local Event Retrieval, Using Sensor Metadata Streams to Identify Topics of Local: meta data streams, cyclic event patterns, Events in the City, Venue Recommendation

UNIT - III

Development Tools for IoT Analytics Applications

Introduction, Related Work, The VITAL Architecture for IoT Analytics Applications: Platform Provider Interface (PPI), Data Management Service (DMS), IoT Data Adapter (PADA), IoT Service Discovery(DS), Filtering and Complex Event Processing, Orchestration, VITAL Development Environment: Overview, Vital Nodes, Development Examples

UNIT - IV

An Open-Source Framework for IoT Analytics as a Service

Introduction, Architecture for IoT Analytics-as-a-Service: Comparing & Simplified IoT architecture, the core IoT functional stock, IoT Data Management, Sensing-as-a-Service Infrastructure Anatomy, Scheduling, Metering and Service Delivery, Sensing-as-a-Service Example, From Sensing-as-a-Service to IoT-Analytics- as-a-Service

UNIT - V

A Review of Tools for IoT Semantics and Data Streaming Analytics: Introduction, Related Work: Autoscaling of resources and dynamic work rebalancing, Monitoring and observability of Data, Semantic Analysis, Tools and Platforms

Data Analytics for Smart Cities Introduction, Cloud-based IoT Analytics: IoT and Cloud Computing, Data Collection and Storage, Cloud-based City Platform, Solutions, Edge, State of the Art, Edge-based City Platform, Workflow, Task and Topology, IoT-friendly Interfaces.

TEXT BOOKS:

1. Building Blocks for IoT Analytics by John Soldatos, River Publisher

REFERENCE BOOKS:

1. Analytics for the Internet of Things (IoT)by Andrew miller, Packt Publishing.
2. Big Data Analytics for Internet of Things by Tausifa Jan Saleem, Mohammad Ahsan Chishti, Wiley Publishing.

WEB-LINKS:

1. https://iot-analytics.com/iot-cloud/
2. https://www.databricks.com/blog/2020/08/03/modern-industrial-iot-analytics-on-azure-part-1.html
3. https://expertinsights.com/insights/the-top-iot-analytics-platforms/
4. https://www.udemy.com/course/iot-data-analytics

CLOUD SECURITY (Professional Elective – VI)

B.Tech. VIII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY863PE

Pre-requisites: Computer Networks, Cryptography and Network Security, Cloud Computing.

Course Objectives:

1. To understand the fundamentals concepts of cloud computing.
2. To understand the cloud security and privacy issues.
3. To understand the Threat Model and Cloud Attacks
4. To understand the Data Security and Storage
5. To understand security considerations and management in cloud computing environment

Course Outcomes:

1. Acquire the knowledge on fundamentals concepts of cloud computing.
2. Distinguish the various cloud security and privacy issues.
3. Analyze the various threats and Attack tools
4. Understand the Data Security and Storage concepts.
5. Students will learn to develop strategies for effective security management

UNIT - I

Overview of Cloud Computing: Introduction, Definitions and Characteristics, Cloud Service Models: IaaS, PaaS, SaaS, Cloud Deployment Models, Cloud Service Platforms: Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP).

Introduction to Cloud Security: Introduction, Cloud Security Concepts: Data Protection, Identity and Access Management (IAM), Threat Detection and Response, Compliance, CSA Cloud Reference Model, NIST Cloud Reference Model: Consumer, Provider, Auditor, Broker, Carrier.

UNIT - II

Cloud Security and Privacy Issues: Introduction, Cloud Security Goals/Concepts: Confidentiality, Integrity, Availability, Authentication, Cloud Security Issues, Security Requirements for Privacy, Privacy Issues in Cloud.

Infrastructure Security: The Network Level, the Host Level, The Application Level, SaaS Application Security: Data Encryption, Identity and Access Management (IAM), PaaS Application Security: Environment Hardening, Secure APIs, IaaS Application Security: Network and Storage security.

UNIT – III

Threat Model and Cloud Attacks: Introduction, Threat Model- Type of attack entities, Attack surfaces with attack scenarios: Network Interfaces, APIs, Hypervisors, Data Storage, A Taxonomy of Attacks: Target, Method, Impact.

Attack Tools: Network-level attack tools: Wireshark, Nmap, Metaspolit, VM-level attack tools: LibVMI, Cuckoo Sandbox, VMM attack tools: HyperSpector, Xen Debugger, Security Tools, VMM security tools.

UNIT - IV

Information Security Basic Concepts: Types of Security Threats, Access Control Mechanisms, An Example of a Security Attack, Cloud Software Security Requirements, Rising Security Threats.

Data Security and Storage: Aspects of Data Security: Network Security, Application Security, Data Security Mitigation, Provider Data and ItsSecurity, Storage Security, Communication and Training.

UNIT - V

Evolution of Security Considerations: Security Concerns of Cloud Operating Models, Identity Authentication, Secure Transmissions, Secure Storage and Computation, Security Using Encryption Keys, Challenges of Using Standard Security Algorithms.

Security Management in the Cloud: Security Management Standards, Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management.

TEXT BOOKS:

1. Cloud Security Attacks, Techniques, Tools, and Challenges by Preeti Mishra, Emmanuel S Pilli,Jaipur R C Joshi Graphic Era, 1st Edition published 2022 by CRC press.
2. Cloud Security and Privacy by Tim Mather, Subra Kumaraswamy, and Shahed Lati FirstEdition, September 2019.

REFERENCE BOOKS:

1. Essentials of Cloud Computing by K. Chandrasekaran Special Indian Edition CRC press.
2. Cloud Computing Principles and Paradigms by Rajkumar Buyya, John Wiley.

WEB-LINKS:

1. https://cloudacademy.com/blog/cloud-technology-and-security-alert-news-digest-issue-1/
2. https://www.coursera.org/courses?query=cloud%20security
3. https://www.udemy.com/topic/Cloud-Security/
4. https://www.javatpoint.com/what-is-cloud-security

DIGITAL WATERMARKING AND STEGANOGRAPHY (Professional Elective – VI)

B. Tech VIII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY864PE

Prerequisites: Nill

Course Objectives:

1. To learn about the watermarking models and message coding
2. Understand the evolution of digital rights management and its relation to digital watermarking
3. Understand the properties and requirements of effective watermarks.
4. To learn about steganography Perceptual models.
5. Understand and apply various metrics for evaluating the performance of watermarking.

Course Outcomes:

1. Know the History and importance of watermarking and steganography.
2. Analyze Applications and properties of watermarking and steganography.
3. Demonstrate Models and algorithms of watermarking.
4. Possess the passion for acquiring knowledge and skill in preserving authentication ofInformation.
5. Identify the theoretic foundations of steganography and steganalysis.

UNIT - I

Introduction: Information Hiding, Steganography and Watermarking, History of watermarking, Importance of Digital Watermarking, Applications and Properties, Evaluating watermarking systems. Watermarking models & message coding, Notation, Communications, Communication-based models, Geometric models, Mapping messages into message vectors, Error correction coding, Detecting multi-symbol watermarks.

UNIT - II

Watermarking with side information & analyzing errors: Introduction to Side Information in Watermarking, Types of Side Information, Informed Watermarking Techniques: Informed Embedding, Informed Coding, Models and Frameworks– Structured dirty-paper codes, Message errors, False positive errors, False negative errors, ROC curves– Effect of whitening on error rates.

UNIT - III

Perceptual models: Introduction to Perceptual Models, Visual Perceptual Models**,** Evaluating perceptual impact, General form of a perceptual model, Examples of perceptual models, Robust watermarking approaches, Redundant Embedding, Spread Spectrum Coding, Embedding in Perceptually significant coefficients.

UNIT - IV

Watermark security & authentication: Security requirements and measures: Confidentiality, Data integrity, Data origin authenticity, Entity authenticity, Digital Certificates: Classification and reasons for revocation, Watermark security and cryptography, Attacks, Exact authentication, Selective authentication, Localization, Restoration.

UNIT - V

Steganography: Steganography Communication, Notation and terminology, Information, theoretic foundations of steganography, List of steganography techniques: Digital text, Hiding an image within a sound file, Streaming media, Cyber-physical systems/Internet of Things, Network, Practical steganographic methods, Minimizing the embedding impact, Steganalysis.

TEXT BOOKS:

1. Digital Watermarking and Steganography, Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, Morgan Kaufmann Publishers, New York, 2008.

REFERENCE BOOKS:

1. Techniques and Applications of Digital Watermarking and Contest Protection, Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, Artech House, London, 2003.
2. Digital Watermarking for Digital Media, Juergen Seits, IDEA Group Publisher, New York, 2005.
3. Disappearing Cryptography — Information Hiding: Steganography & Watermarking, Peter Wayner, Morgan Kaufmann Publishers, New York, 2002.

WEB-LINKS:

1. https://www.researchgate.net/publication/238702324_Information_Hiding_Techniques_for_Steganography_and_Digital_Watermaking
2. https://arxiv.org/abs/0802.3746
3. https://www.vitalsource.com/products/digital-watermarking-and-steganography-cox-ingemar-miller-matthew-v9780123725851
4. https://www.mdpi.com/2076-3417/11/22/10928

DATA PRIVACY (Professional Elective – VI)

B.Tech. VIII Semester **L T P C**
3 0 0 3

Subjects Code: 22CY865PE

Prerequisites: Undergraduate level knowledge in basic statistics and databases is needed.

Course Objectives:

1. Understand compliance requirements and enforcement mechanisms.
2. Analyze core principles of data privacy (e.g., data minimization, purpose limitation, consent).
3. Understand risk assessment and management techniques in the context of data privacy.
4. Understand the concepts of Privacy by Design and Privacy by Default.
5. Understand the challenges and solutions for ensuring privacy in these contexts.

Course Outcomes:

1. Students will be able to become familiar with the basics of privacy.
2. Understand the common data privacy techniques.
3. Analyze the privacy implications of emerging technologies and propose solutions.
4. Develop and implement data privacy policies and procedures.
5. Communicate the importance of data privacy to various stakeholders.

UNIT - I

Introduction to Data Privacy: Overview of Data Privacy, Importance of Data Privacy, Protecting Sensitive Data, Use Cases for Data Sharing, Methods of Protecting Data, Balancing Data Privacy and Utility, Introduction to Anonymization Design Principles.

Nature of Data in the Enterprise: Multidimensional Data, Transaction Data, Longitudinal Data, Graph Data, Time Series Data.

UNIT - II

Static Data Anonymization I: Multidimensional Data: -Introduction, Classification of Privacy-Preserving Methods: Introduction to Privacy-Preserving Methods, Anonymization Techniques, Differential Privacy, Secure Multi-Party Computation (SMPC), Federated Learning, Classification of Data in a Multidimensional Data: Protecting explicit identifiers protecting Quasi-identifiers, Group Based Anonymization: k-Anonymization, I-Diversity, t-Closeness, Algorithm Comparison.

UNIT - III

Static Data Anonymization II: Complex Data Structures- Introduction, Privacy Preserving Graph Data: Introduction, Anonymization Techniques for Graph Data, Privacy Models for Graph Data, Challenges and Solutions, Applications. Privacy-Preserving Time Series Data: Introduction to Transactional Data, Anonymization Techniques for Time Series Data, Privacy Models for Time Series Data.

UNIT - IV

Threats to Anonymized Data: Threats to Anonymized Data: Introduction, Types of Threats, Threats to Data Structures: Multidimensional Data, Longitudinal Data, Graph Data, Time Series Data, Transaction Data, Threats by Anonymization Techniques: Randomization, k-Anonymization, l-diversity, t-closeness, Mitigation Strategies: Enhancing Anonymization Techniques, Policy and Governance Measures.

UNIT - V

Privacy-Preserving Data Mining: Introduction, Data Mining: Key Functional Areas of Multidimensional Data, Privacy-Preserving Test Data Manufacturing, Test Data Fundamentals, Privacy Preservation of Test Data.

Synthetic Data Generation: Introduction, Synthetic Data and Their Use, Privacy and Utility in Synthetic Data, Dynamic Data Protection: Tokenization Introduction, Understanding Tokenization, Use Cases for Dynamic Data Protection, Benefits of Tokenization Compared to Other Methods, Components for Tokenization.

TEXT BOOKS:

1. Nataraj Venkataramanan, Ashwin Sriram, *Data Privacy: Principles and Practice*, 2016, 1st Edition, Taylor & Francis. (ISBN No.: 978-1-49-872104-2), United Kingdom.

REFERENCE BOOKS:

1. B. Raghunathan, the Complete Book of Data Anonymization: From Planning to Implementation, 1st Edition, CRC press.
2. L. Sweeney, Computational Disclosure Control: A Primer on Data Privacy Protection, MITComputer Science, 2002.
3. Nishant Bhajaria, Data Privacy: A runbook for engineers, Manning Publications.

WEB-LINKS:

1. https://www.ibm.com/topics/data-privacy
2. https://web.dev/learn/privacy/
3. https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/the-consumer-data-opportunity-and-the-privacy-imperative
4. https://www.geeksforgeeks.org/difference-between-data-privacy-and-data-security/
5. https://www.javatpoint.com/ai-and-data-privacy

DATA PRIVACY (Open Elective – III)

B.Tech. VIII Semester

L	T	P	C
3	0	0	3

Subjects Code: 22CY831OE

Prerequisites: Undergraduate level knowledge in basic statistics and databases is needed.

Course Objectives:

1. Understand compliance requirements and enforcement mechanisms.
2. Analyze core principles of data privacy (e.g., data minimization, purpose limitation, consent).
3. Understand risk assessment and management techniques in the context of data privacy.
4. Understand the concepts of Privacy by Design and Privacy by Default.
5. Understand the challenges and solutions for ensuring privacy in these contexts.

Course Outcomes:

1. Students will be able to become familiar with the basics of privacy.
2. Understand the common data privacy techniques.
3. Analyze the privacy implications of emerging technologies and propose solutions.
4. Develop and implement data privacy policies and procedures.
5. Communicate the importance of data privacy to various stakeholders.

UNIT - I

Introduction to Data Privacy: Overview of Data Privacy, Importance of Data Privacy, Protecting Sensitive Data, Use Cases for Data Sharing, Methods of Protecting Data, Balancing Data Privacy and Utility, Introduction to Anonymization Design Principles.

Nature of Data in the Enterprise: Multidimensional Data, Transaction Data, Longitudinal Data, Graph Data, Time Series Data.

UNIT - II

Static Data Anonymization I: Multidimensional Data: -Introduction, Classification of Privacy-Preserving Methods: Introduction to Privacy-Preserving Methods, Anonymization Techniques, Differential Privacy, Secure Multi-Party Computation (SMPC), Federated Learning, Classification of Data in a Multidimensional Data: Protecting explicit identifiers protecting Quasi-identifiers, Group Based Anonymization: k-Anonymization, I-Diversity, t-Closeness, Algorithm Comparison.

UNIT - III

Static Data Anonymization II: Complex Data Structures- Introduction, Privacy Preserving Graph Data: Introduction, Anonymization Techniques for Graph Data, Privacy Models for Graph Data, Challenges and Solutions, Applications. Privacy-Preserving Time Series Data: Introduction to Transactional Data, Anonymization Techniques for Time Series Data, Privacy Models for Time Series Data.

UNIT - IV

Threats to Anonymized Data: Threats to Anonymized Data: Introduction, Types of Threats, Threats to Data Structures: Multidimensional Data, Longitudinal Data, Graph Data, Time Series Data, Transaction Data, Threats by Anonymization Techniques: Randomization, k-Anonymization, l-diversity, t-closeness, Mitigation Strategies: Enhancing Anonymization Techniques, Policy and Governance Measures.

UNIT - V

Privacy-Preserving Data Mining: Introduction, Data Mining: Key Functional Areas of Multidimensional Data, Privacy-Preserving Test Data Manufacturing, Test Data Fundamentals, Privacy Preservation of Test Data.

Synthetic Data Generation: Introduction, Synthetic Data and Their Use, Privacy and Utility in Synthetic Data, Dynamic Data Protection: Tokenization Introduction, Understanding Tokenization, Use Cases for Dynamic Data Protection, Benefits of Tokenization Compared to Other Methods.

TEXT BOOKS:

1. Nataraj Venkataramanan, Ashwin Sriram, *Data Privacy: Principles and Practice*, 2016, 1st Edition, Taylor & Francis. (ISBN No.: 978-1-49-872104-2), United Kingdom.

REFERENCE BOOKS:

1. B. Raghunathan, the Complete Book of Data Anonymization: From Planning to Implementation, 1st Edition, CRC press.
2. L. Sweeney, Computational Disclosure Control: A Primer on Data Privacy Protection, MITComputer Science, 2002.
3. Nishant Bhajaria, Data Privacy: A runbook for engineers, Manning Publications.

WEB-LINKS:

1. https://www.ibm.com/topics/data-privacy
2. https://web.dev/learn/privacy/
3. https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/the-consumer-data-opportunity-and-the-privacy-imperative
4. https://www.geeksforgeeks.org/difference-between-data-privacy-and-data-security/
5. https://www.javatpoint.com/ai-and-data-privacy

5G TECHNOLOGIES (Open Elective – III)

B.Tech. VIII Semester

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Subjects Code: 22CY832OE

Prerequisites: NILL

Course Objectives:

1. Study the architectural framework and key components of 5G networks.
2. Analyze the 5G Spectrum and Regulatory Environment.
3. Explore 5G Network Deployment and Optimization.
4. Understand Security and Privacy in 5G Networks.
5. Explore the Economic and Societal Impact of 5G.

Course Outcomes:

1. Students should be able to Understand the Evolution and Architecture of 5G.
2. Apply Knowledge of Key 5G Technologies.
3. Analyze the spectrum allocation process and its impact on network performance.
4. Develop strategies for deploying 5G networks.
5. Evaluate the economic benefits and potential disruptions of 5G.

UNIT - I

Overview of 5G Broadband Wireless Communications: Mobile Communications Generations: From 1G to 4G, Rationale of 5G – Requirements: Introduction to 5G, Performance Requirements, Technical Requirements, Use Cases and Applications, Standardization Activities: 3GPP (3rd Generation Partnership Project), ITU (International Telecommunication Union), IEEE (Institute of Electrical and Electronics Engineers).

UNIT - II

The 5G wireless Propagation Channels: Channel Model Requirements: Introduction, Key Requirements, Performance Metrics, Propagation Scenarios and Challenges in the 5G Modeling: Overview of Propagation Scenarios, Challenges in 5G Channel Modeling, Solutions and Approaches, Channel Models for mmWave: Introduction, Propagation Characteristics, Modeling Approaches, MIMO Systems.

UNIT - III

The 5G radio-access technologies: Access design principles for multi-user communications — Orthogonal Frequency Division Multiplexing (OFDM), Filter Bank Multi-Carriers (FBMC) and Universal Filtered Multi-Carrier (UFMC), Multiple Access Techniques – Orthogonal Frequency Division Multiple Accesses (OFDMA), Non-Orthogonal Multiple Accesses (NOMA).

UNIT - IV

Device-to-Device (D2D) Communications: Introduction, Extension of 4G D2D standardization to 5G: Transition to 5G D2D, Standardization Bodies and Efforts, Radio Resource Management for Mobile Broadband D2D, RRM (Radio Resource Management) Challenges and Techniques, Dynamic Resource Management, Multi-Hop and Multi-Operator D2D Communications, Security and Privacy in D2D Communications.

UNIT - V

Millimeter-wave Communications: Spectrum and Regulations, Deployment scenarios, Beam-forming,physical layer techniques.

Massive MIMO propagation channel models, Pilot design for Massive MIMO, Resource allocation and transceiver algorithms for massive MIMO, Fundamentals of baseband and RF implementations in massive MIMO.

TEXT BOOK:

1. Afif Osseiran, Jose.F. Monserrat, Patrick Marsch, "Fundamentals of 5G Mobile Networks", Cambridge University Press.

REFERENCE BOOKS:

1. Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", John Wiley & Sons.
2. Amitabha Ghosh and Rapeepat Ratasuk "Essentials of LTE and LTE-A", Cambridge UniversityPress
3. Athanasios G. Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos, "New Directions inWireless Communication Systems from Mobile to 5G", CRC Press.
4. Theodore S. Rappaport, Robert W. Heath, Robert C. Danials, James N. Murdock "MillimeterWave Wireless Communications", Prentice Hall Communications.
5. Martin Sauter "From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to MobileNetworks and Mobile Broadband", Wiley-Blackwell.

WEB_LINKS:

1. https://www.researchgate.net/publication/349096812_The_Complete_Guide_to_5G_Training_for_2021
2. https://www.udemy.com/course/5g-for-absolute-beginners/
3. https://brianvanderwaal.com/5g-course
4. https://www.researchgate.net/publication/327136258_Lecture_Notes_on_Mobile_Communication
5. https://www.javatpoint.com/what-is-5g