SEMESTER I

Paper Name: Mathematics for Computer Science
Code:
Contact: 3L+1T
Credits:4
Allotted Hrs: 36

UNIT I: Modern algebra

Binary Operation; Addition Modulo n; Multiplication modulo n; semi group; properties of groups; subgroup.

UNIT II: Trigonometry

Radian or circular Measure; Trigonometric Functions; Trigonometric ratios of angle θ when θ is acute; trigonometric ratios of certain standard angles; allied angles; compound angles; multiple and sub- multiple angles.

UNIT III: Limits and Continuity

The real number system; The concept of limit; concept of continuity.

UNIT IV: Differentiation

Differentiation of powers of x; Differentiation of ex and log x; differentiation of trigonometric functions; Rules for finding derivatives; Different types of differentiation; logarithmic differentiation; differentiation by substitution; differentiation of implicit functions; differentiation from parametric equation. Differentiation from first principles.

UNIT V: Integrations

Integration of standard Functions; rules of Integration; More formulas in integration; Definite integrals.

UNIT VI: Differential equations

First order differential equations; practical approach to Differential equations; first order and first degree differential equations; homogeneous equations. Linear equations; Bernoulli's equation; Exact Differential Equations.

UNIT VII: Complex Numbers

Complex Numbers; Conjugate of a complex number; modulus of a complex Number; geometrical representation of complex number; De Moivere's theorem; nthroots of a complex number.

UNIT VIII: Matrices and Determinants

Definition of a matrix; Operations on matrices; Square Matrix and its inverse; determinants; properties of determinants; the inverse of a matrix; solution of equations using matrices and determinants; solving equations using determinants.

UNIT IX: Infinite Series

Convergence and divergence; series of positive terms; binomial series; exponential series;logarithmic series.

UNIT X: Probability

Concept of probability; sample space and events; three approaches of probability; kolmogorov's axiomatic approach to probability; conditional probability and independence of events; bay's theorem.

UNIT XI: Basics Statistics

Measures of central Tendency; Standard Deviation; Discrete series. Methods; Deviation taken from assumed mean; continuous series; combined standard deviation; coefficient of variation; variance.

Reference Books:

1. Banerjee A., De S.K. and Sen S.: Mathematical Probability, U.N. Dhur& Sons.

2. Gupta S. C and Kapoor V K: Fundamentals of Mathematical Statistics, Sultan Chand & Sons.

Paper Name: Programming for Problem Solving
Code:
Contact: 3L
Credits:3
Allotted Hrs: 36

Unit I:

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts. Number Systems: Binary, Octal, Decimal, Hexadecimal Introduction to C Language - Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements Arithmetic Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions.

Unit II:

Conditional Control Statements: Bitwise Operators, Relational and Logical Operators, If, If- Else, Switch-Statement and Examples. Loop Control Statements: For, While, DoWhile and Examples. Continue, Break and Goto statements Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing. Recursion- Recursive Functions.. Storage Classes: Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers.

Unit III:

Preprocessors: Preprocessor Commands Arrays - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble Sort.

Unit IV:

Pointers - Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, Lvalue and Rvalue, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command Line Arguments. Strings - Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions.

Unit V:

Structures: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions, Type Definition (typedef), Enumerated Types. Input and Output: Introduction to Files, Modes of Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.

Reference Books :

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Gary J. Bronson, A First Book of ANSI C, 4th Edition, ACM
4. Kenneth A. Reek, Pointers on C, Pearson
5. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Paper Name: Electrical & Electronics Engineering
Code:
Contact: 3L+1T
Credits:4
Allotted Hrs: 36

Unit I: ELECTRICAL CIRCUITS & MEASUREMENTS

Fundamental laws of electric circuits, Steady State Solution of DC Circuits – Introduction to AC Circuits -Sinusoidal steady state analysis, Power and Power factor - Single Phase and Three Phase Balanced Circuits. Classification of instruments - Operating Principles of indicating Instruments

Unit II: ELECTRICAL MACHINES

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

Unit III: SEMICONDUCTOR DEVICES AND APPLICATIONS

Introduction - Characteristics of PN Junction Diode – Zener Effect - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers - Voltage Regulation. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal Amplifier.

Unit IV: DIGITAL ELECTRONICS

Binary Number System – Boolean algebra theorems, Digital circuits - Introduction to sequential Circuits, Flip-Flops - Registers and Counters – A/D and D/A Conversion - digital processing architecture.

Unit V: FUNDAMENTALS OF COMMUNICATION ENGINEERING

Introduction - Elements of Communication Systems, Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Digital Communication -

Communication Systems: Radio, Antenna, TV, Fax, ISDN, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

Reference Books:

1. DP Kothari and 1.J Nagarath, "Electrical Machines "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint,2016

2. S.K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson India, 2011

3. Sedha R.S., "Applied Electronics", S. Chand & Co., 2006

4. A.E.Fitzgerald, David E Higginbotham and Arvin Grabel, "Basic Electrical Engineering",
*M*cGraw Hill Education(India) Private Limited, 2009

5. Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007

6. "Foundations of Electrical Engineering", Oxford University Press, 2013

7. MahmoodNahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series,
McGraw Hill, 2002.

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

Paper Name: Introduction to AI & Machine Learning
Code:
Contact: 3L
Credits:3
Allotted Hrs: 36

Unit I: Introduction to AI

Introduction to artificial intelligence ,Course structure and policies ,History of AI , Proposing and evaluating AI applications , Case study: Google Duplex.

Unit II: Search and Planning

Problem spaces and search , Knowledge and rationality , Heuristic search strategies ,Search and optimization (gradient descent) , Adversarial search ,Planning and scheduling , Case studies: Playing chess, Manufacturing scheduling.

Unit III: Knowledge Representation and Reasoning

Logic and inference , Ontologies ,Bayesian reasoning ,Temporal reasoning , Case study: Medical diagnosis.

Unit IV: Machine learning: Supervised methods

What is machine learning? ,Supervised vs. unsupervised learning , Regression -- linear, logistic, ridge ,Classification – decision trees, SVM, random forests , Model performance evaluation – MSE, lift, AUC, Type 1 vs 2 errors , Case study: Bank failure prediction (also part of HW#2).

Unit V: Machine learning: Unsupervised methods

Dimensionality reduction: PCA , Clustering – k-means, hierarchical clustering , Semi-supervised methods , Reinforcement learning , Choosing among machine learning techniques , Case study: Public health outcome clustering.

Unit VI: Deep Learning

Neural networks and back-propagation , Convolutional neural networks ,Recurrent neural networks and LSTMs

Unit VII: Image Processing

Introduction to computer vision , Image segmentation ,Object and motion detection , Object classification , Use of pre-trained models (VGG16, Inception.)

Unit VIII: Natural Language Understanding

Intro to natural language understanding , Case study: Machine translation , Sentiment analysis , Application of deep learning to NLP

Unit IX:Robotic Sensing and Manipulation

Introduction to robotics , Sensing , Manipulation , Human-robot interaction.

Unit X:Mobile Robots

Navigation and path planning , Learning and robotics: Reinforcement learning , Case study: Autonomous vehicles technologies and impacts.

Unit XI:AI in the Enterprise

AI in the enterprise

Unit XII :Ethical and Legal Considerations in AI

Privacy , Bias ,AI and the future of work , Appropriate uses of AI ,Case study: AI to predict re-arrests.

Unit XIII :Infrastructure for AI

Parallel and distributed computing for scalability: , Resolving technical tradeoffs , Case study: Uber and Facebook.

Unit XIV:The Future of AI & Final Project Presentations

The future of AI: Emerging developments , Final project presentations and wrap-up.

Reference Books:

1. Russell &Norvig, Introduction in *Artificial Intelligence: A Modern Approach*.

2. *Python MachineLearning by Sebastian Raschka*.

Paper Name: Introduction to Information Security
Code: CS103
Contacts: 3L+1T
Credits: 3

Introduction- Fundamental Concepts, Definitions, Statistics, Data Privacy Attacks, Data linking and profiling, access control models, role based access control, Hierarchical Access control, privacy policies, languages and implementation, privacy policy languages, privacy in different domains- medical, financial, etc.

Data explosion- Statistics and Lack of barriers in Collection and Distribution of Person-specific information, Mathematical model for characterizing and comparing real-world data sharing practices and policies and for computing privacy and risk measurements, Demographics and Uniqueness.

Protection Models- Null-map, k-map, Wrong map

Survey of techniques- Protection models (null-map, k-map, wrong map), Disclosure control, Inferring entity identities, Strength and weaknesses of techniques, entry specific databases.

Computation systems for protecting delimited data- MinGen, Datafly, Mu-Argus, k-Similar, Protecting textual documents: Scrub.

Technology, Policy, Privacy and Freedom- Medical privacy legislation, policies and best practices, Examination of privacy matters specific to the World Wide Web, Protections provided by the Freedom of Information Act or the requirement for search warrants.

Paper Name: English Communication/Soft Skills
Code:
Contact: 3L
Credits:3
Allotted Hrs: 36

Unit I:Grammar(5 lectures)
Correction of sentence, Vocabulary / word formation, Single word for a group of words, Fill in the blank, transformation of sentences, Structure of sentences – Active / Passive Voice – Direct / Indirect Narration
Unit II:(7 lectures)
Essay – Descriptive – Comparative – Argumentative – Thesis statement- Structure of opening
/ concluding paragraphs – Body of the essay
Unit III:(8 lectures)
Reading Comprehension – Global – Contextual – Inferential – Select passages from recommended text
Unit IV:(7 lectures)
Business Correspondence – Letter Writing – Formal. Drafting. Biodata- Resume′- Curriculum Vitae
Unit V:(8 lectures)
Report Writing – Structure , Types of report – Practice Writing
Unit VI:(7 lectures)
Communication / Public Speaking skills , Features of effective speech, verbal-nonverbal
Unit VII:(6 lectures)
Group discussion – principle – practice

Reference Books:
1. Mark MaCormack : "Communication"
2. John Metchell" How to write reports"
3. S R Inthira& V Saraswathi" Enrich your English – a) Communication skills b)

Academic

skills " Publisher CIEFL & OUP
4. R.C. Sharma and K.Mohan , "Business Correspondence and Report Writing " , Tata McGraw Hill , New Delhi , 1994
5. L.Gartside , "Model Business Letters" , Pitman , London , 1992
6. Longman , "Longman Dictionary of Contemporary English" (or 'Oxford Advanced Learner's Dictionary of Current English' , OUP , 1998.
7. Maxwell Nurnberg and RosenblumMorris , "All About Words" , General Book Depot, New Delhi , 1995
8. A Text Book for English foe Engineers & Technologists

Paper Name: Programming for Problem Solving Lab
Contacts: 4P
Credits: 2
Exercises should include but not limited to:

1. DOS System commands and Editors (Preliminaries)
2. UNIX system commands and vi (Preliminaries)
3. Simple Programs: simple and compound interest. To check whether a given number is a palindrome or not, evaluate summation series, factorial of a number , generate Pascal's triangle, find roots of a quadratic equation
4. Programs to demonstrate control structure : text processing, use of break and continue, etc.
5. Programs involving functions and recursion
6. Programs involving the use of arrays with subscripts and pointers
7. Programs using structures and files.

Paper Name: English Communication/Soft Skills Lab
Contacts:4P
 Credit: 2

a) Honing 'Listening Skill' and its sub skills through Language Lab Audio device; 3P
b) Honing 'Speaking Skill' and its sub skills; 2P
c) Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch &Accent) of connected speech; 2P 17
j) Honing 'Conversation Skill' using Language Lab Audio –Visual input; Conversational Practice Sessions (Face to Face / via Telephone , Mobile phone & Role Play Mode); 2P
k) Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success; 2P
 f) G D Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD; 4P
g) Honing 'Reading Skills' and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non Technical Passages; Learning Global / Contextual / Inferential

Comprehension; 2P

h) Honing 'Writing Skill' and its sub skills by using Language Lab Audio –Visual input; Practice Sessions 2P

Total Practical Classes 17

Books :

Dr. D. Sudharani: Manual for English Language Laboratory Pearson Education (WB edition),2010 Board of Editors: Contemporary Communicative English for Technical Communication Pearson Longman, 2010.

SEMESTER II

Paper Name: Discrete Mathematics
Code:
Contact: 3L+1T
Credits:4
Allotted Hrs: 36

Unit I: Set Theory:

Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle. Relation: Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation. Function: Definition and types of function, composition of functions, recursively defined functions.

Unit II: Propositional logic:

Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradictions, normal forms (conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification. Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof, proof by using truth table, proof by counter example.

Unit III: Combinatories

Mathematical induction, recursive mathematical definitions, basics of counting, permutations, combinations, inclusion-exclusion, recurrence relations (nth order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relation), generating function (closed form expression, properties of G.F., solution of recurrence relation using G.F, solution of combinatorial problem using G.F.)

Unit IV: Algebraic Structure:

Binary composition and its properties definition of algebraic structure; Groyas Semi group, Monoid Groups, Abelian Group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).

Unit V: Graphs

Graph terminology, types of graph connected graphs, components of graph, Euler graph, Hamiltonian path and circuits, Graph coloring, Chromatic number. Tree: Definition, types of tree(rooted, binary), properties of trees, binary search tree, tree traversing (preorder, inorder, post order). Finite Automata: Basic concepts of Automation theory, Deterministic finite Automation (DFA), transition function, transition table, Non Deterministic Finite Automata (NDFA), Mealy and Moore Machine, Minimization of finite

Automation.

Reference Books:
1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Mc.Graw Hill, 2002.
2. J.P.Tremblay& R. Manohar, "Discrete Mathematical Structure with Applications to PDF created with pdfFactory Pro trial version www.pdffactory.com Computer Science" Mc.Graw Hill, 1975.
3. V. Krishnamurthy, "Combinatories:Theory and Applications", East-West Press.
4. Seymour Lipschutz, M.Lipson, "Discrete Mathematics" Tata McGraw Hill, 2005.
5. Kolman, Busby Ross, "Discrete Mathematical Structures", Prentice Hall International.

Paper Name: Data Privacy & Security
Paper Code:
Contact: 3L
Credit: 3

Foot printing, Google Hacking, Active and Passive Reconnaissance.
Different types of Port scanning, host and service discovery
Enumeration, SNMP Enumeration, SMTP Enumeration, Enumeration countermeasure
Vulnerability Assessment,
Different types of Sniffing, Active and Passive sniffing, MAC spoofing,
Password cracking, Dictionary and Brute force Attack, creating wordlist for password attack,
Trojans and backdoors,
DoS/DDos Concepts, DoS/DDos Attack Techniques
Cryptography and encryption techniques, symmetric and asymmetric key encryption and their uses, IDS, Firewall and Honeypot Concepts, Antivirus, Types of Firewall and Honeypot, IDS.

Reference Books:
1) Cryptography and Network Security by AtulKahate. Publisher –Tata Mc. GrawHill
2) Guide to Computer Network Security : ISBN-10: 1447145429
   ISBN-13: 978-1447145424, Publisher - Springer
3) Kali Linux cookbook – by Willie L. Pritchett , David De Smet - Publisher –PACKT
4) Web Penetration Testing with Kali Linux, by - Joseph Muniz Aamir Lakhani, Publisher- PACKT

Paper Name: Introduction to Ethical Hacking

Paper Code:
Contact: 3 L+1T
Credit: 4

1. Key issues plaguing the information security world, incident management process, and penetration testing
2. What is Ethical Hacking
3. Legal Agreement

4. Types of Hackers
5. Who is a Hacker
6. Security Challenges
7. Enumeration techniques and enumeration countermeasures
8. System hacking methodology
9. Skills required for an Ethical Hacker
10. Types of Attacks
11. What do Ethical Hackers Do
12. Vulnerability Research
13. Effects of Hacking
14. Dierent types of Trojans, Trojan analysis, and Trojan countermeasures Working of viruses, virus analysis, computer worms, malware analysis procedure, and countermeasures Packet sni-ng techniques and how to defend against sni-ng
15. How can Hacking be Ethical
16. Types of Data Stolen from the organisation
17. What is Penetration Testing

Paper Name: Data Structure with Python
Code:
Contact: 3L
Credits: 3
Allotted Hrs: 36

Unit I: Introduction to Data Structure:
　　　Abstract Data Type.

Unit II: Arrays
　　　1D, 2D and Multi-dimensional Arrays, Sparse Matrices. Polynomial representation (Polynomial Representation as Application).

Unit III: Linked Lists
　　　Singly, Doubly and Circular Lists; Normal and Circular representation of Self Organizing Lists; Skip Lists, Polynomial representation (Polynomial Representation as Application).

Unit IV: Stacks
　　　Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and　　conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack

Unit V: Queues
　　　Array and Linked representation of Queue, Circular Queue, De-queue, Priority Queues

Unit VI: Recursion
　　　Developing Recursive Definition of Simple Problems and their implementation; Advantages and　　Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack　　Implementation)

Unit VII: Trees
　　　Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals of Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals);　Height-Balanced Trees (Various operations on AVL Trees).

Unit VIII: Searching and Sorting
　　　Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Merge Sort, Quick sort, Shell Sort, Comparison of Sorting Techniques

Unit IX:Hashing
　　　Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash

Table Reordering, Resolving collision by Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing, Choosing a Hash Function, Perfect Hashing Function.

Reference Books:

1. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan AndersonFreed, Silicon Pr.
2. Data Structures: A Pseudocode Approach with C, Richard F. Gilberg and Behrouz A. Forouzan, Cengage Learning
3. Data Structures In C, Noel Kalicharan, CreateSpace Independent Publishing Platform.
4. Adam Drozdek, Data Structures and algorithm in C, Cengage Learning.
5. The C Programming Language, Brian W. Kernighan and Dennis Ritchie, Prentice Hall.
6. SartajSahni, Data Structures, Algorithms and applications in C++, Second Edition, Universities Press, 2011.
7. Aaron M. Tanenbaum, Moshe J. Augenstein, YedidyahLangsam, Data Structures Using C and C++, 2nd ed., PHI, 2009.

Paper Name: Environmental Science
Code:
Contact: 1L
Credits:1
Allotted Hrs: 36

Unit I: General

Basic ideas of environment, basic concepts, man, society & environment, their interrelationship. 1L

Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non- renewable, potentially renewable, effect of excessive use vis-à-vis population growth,

Sustainable Development. 2L

Materials balance: Steady state conservation system, steady state system with non conservative pollutants, step function. 1L

Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management; Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering.2L

Unit II: Ecology

Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function. 1L

Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar

ban); Food chain [definition and one example of each food chain], Food web. 2L

Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. 1L

Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity. 2L

Unit III: Air pollution and control

Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere,Tropopause and Mesopause. Energy balance:Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems.Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food.Global warming and its consequence, Control of Global

warming. Earth's heat budget. Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model. Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green house gases, effect of ozone modification. Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference).

Unit IV:Water Pollution and Control

Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. River/Lake/ground water pollution: River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river[deoxygenation, reaeration], COD, Oil, Greases, pH. Lake: Eutrophication [Definition, source and effect]. Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only) Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening] Wastewater treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition. Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic

Unit V:Land Pollution

Lithosphere; Internal structure of earth, rock and soil 1L Solid Waste: Municipal, industrial,
commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and
disposal method- Open dumping, Land filling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste).

Unit VI: Noise Pollution

Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise] Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, 10 L (18hr Index), Ldn.Noise pollution control.

Unit VII:Environmental Management:

Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.

Reference Books

1. Masters, G. M., "Introduction to Environmental Engineering and Science", Prentice-Hall of India Pvt. Ltd., 1991.
2. De, A. K., "Environmental Chemistry",New Age International.

Paper Name: Data Privacy & Security Lab
Contact: 4P
Credit: 2

1. Footprinting and Reconnaissance Lab

   - Information gathering using public resources
   - Mirroring a website
   - Extracting archive versions of website
   - Querying the domain registration information using Who.is
   - Extracting sensitive information using Google dork Traceroute Analysis

2. Network Scanning
   - Host discovery
   - Port scanning using Nmap,
   - OS discovery
   - Service discovery
   - TCP-SYN Scan
   - Using Nmap scripts to find vulnerabilities
   - Vulnerability Scanning using Nessus
   - Discovering and creating network map using LAN Surveyor/Network View

3. Sniffing
   MAC flooding using Macof
   MAC Spoofing and MAC changing
   Packet capturing using Wireshark

4. DoS Attack
   DoS attack using HPing 3

5. Trojans and Backdoor
   Remote Access Trojan
   - Netcat as backdoor
   - Bind shell and Reverse shell

6. Cryptography and Encryption
   Calculating hash values using different hash calculator

Paper Name: Data Structure with Python Lab
Contact: 4P
Credit: 2

Experiments should include but not limited to :

Implementation of array operations: Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem : Evaluation of expressions operations on Multiple stacks & queues : Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues using linked lists: Polynomial addition, Polynomial multiplication Sparse Matrices : Multiplication, addition. Recursive and Nonrecursive traversal of Trees Threaded binary tree traversal. AVL tree implementation Application of Trees. Application of sorting and searching algorithms Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.