22EN101	PROFESSIONAL ENGLISH	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- Develop Professional English language skills by developing vocabulary and reading skills of the students
- Describe things and events in the context of professional world.
- Express appropriate tone and style according to the context of professional communication.

UNIT I PROFESSIONAL EXPRESSIONS   (6+6)

Vocabulary: Understanding corporate structure, Finding and recording collocations, Computer terms: email and website terms; **Grammar:** Tenses; **Reading:** Changing places: job swapping at work, Haier: an article about the history of a Chinese company, an article about how to think of good business ideas; **Writing:** Set phrases for emails and letters, writing emails: formal and informal styles

Practical Component:

Speaking: Describing jobs; asking other people about their job, Asking questions about companies and jobs; **Listening:** Describing changes in a company: a conversation on the phone, Being a PA, Growing pains: an interview with a business consultant about company growth.

UNIT II: PROFESSINAL NEGOTIATIONS   (6+6)

Vocabulary: Vocabulary to talk about advertising and marketing; Language to describe cause and effect, Verbs to describe processes; **Grammar:** Modal verbs of obligation, Words to describe causes and effects, Contrast words; **Reading:** Selling your product abroad: an article, Workplace signs and notices, Descriptions of advertising media , Singapore Airlines: an article on the branding of an airline; **Writing:** Writing MoU and email of Negotiation.

Practical Component:

Listening: An interview about a production process, Telephone conversation: information about orders and deliveries, Description of how a product is advertised; **Speaking:** Describing objects, Role-play: a telephone call to a supplier, Describing a product and how it is advertised.

UNIT III: BUSINESS RELATIONSHIPS   (6+6)

Vocabulary: Suffixes, Word Building, Global Management, Language for making appointments; **Grammar:** Countable and uncountable nouns; Articles, Comparatives: as…as structures, Superlatives; **Reading:** Netflix: an article about a company's holiday policy; Thinking outside the box: an article on offsite meetings; **Writing:** A thank you letter to a business host, An email requesting information

Practical Component:

Listening: An interview with someone who has changed career, Creating good teams: a presentation; **Speaking:** Role-play: interviewing someone about a job change, Discussion: planning a team building event.

UNIT IV: CORPORATE TRENDS   (6+6)

Vocabulary: Describing trends, Finance vocabulary, Stocks and shares; **Grammar:** Adjectives and adverbs, Pronouns and reference words; **Reading:** Interpreting bar charts, Teenage entrepreneurs: reading and comparing two articles; Kalido: an article on funding; **Writing:** A description of a line graph, Writing a letter to express an interest in a new product

Practical Component:

Listening: An interview with the employee of a company that helps failing businesses, An interview with someone who works in investor relations; **Speaking:** Describing figures and trends, Discussing company information.

UNIT V: HUMAN RESOURCES   (6+6)

Vocabulary: Headings for CVs; Describing application procedures, Employment vocabulary; **Grammar:** First, second and third conditionals, Infinitive and –ing forms; **Reading:** A book extract, A business report; **Writing:** An email to a recruitment agency, Filling in a form; An email to book a place on a course

Practical Component:

Listening: An interview with a career adviser, an interview with someone who works for a recruitment agency; **Speaking:** Discussing qualities needed in candidates for a job vacancy, Ways to improve employee productivity;

Total: 60 Hours

COURSE OUTCOMES:

- Understand the basic objectives of the course by being acquainted with specific dimensions of professional communication skills.
- Create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc.
- Apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication
- Evaluate the correct & error-free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & also for academic uses.
- Apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics.

References

1. Raman, Meenakshi and Sangeeta Sharma. "Professional Communication" Oxford University Press: Oxford, 2014

2. Cambridge "Business Benchmark": Cambridge University Press, 2016.

3. Raymond Murphy, "English Grammar in Use"-4 thedition: Cambridge University Press, 2004

Web Resources:

1. https://www.scu.edu/ethics/focus-areas/more/engineering-ethics/engineering-ethics-cases

22MA201	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

Course Objective:

1. To learn the diagonalization of symmetric matrices and the reductions of quadratic form to canonical form.

2. To impart knowledge on applications of differential calculus.

3. To familiarize the student with functions of several variables.

4. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

5. To learn the various analytical methods of finding the solutions of linear differential equations.

Unit I   MATRICES   9+3

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

Unit II   GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS   9+3

Radius of Curvature – Cartesian form – Center and Circle of Curvature – Evolutes – Envelopes.

Unit III   FUNCTIONS OF SEVERAL VARIABLES   9+3

Total derivative – Partial derivatives – Jacobians – Taylor's expansion – Maxima and Minima of function of two variables.

Unit IV   MULTIPLE INTEGRALS   9+3

Double integrals – Cartesian form – Change of order of integration – Area enclosed by plane curves – Triple integrals – Volume of solids.

Unit V   DIFFERENTIAL EQUATIONS   **9+3**

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

Total: 60 Hours

Course Outcomes:

After completion of the course, the student will be able to

CO1   Find Eigen values and Eigenvectors, diagonalization of a matrix and reduction of a quadratic form to canonical form.

CO2   Find evaluates and envelopes of standard curves.

CO3   Use differential calculus ideas on functions of several variables.

CO4   Find the area and volume using multiple integrals.

CO5   Apply various techniques in solving differential equations.

Text Books

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

2.   Veerarajan T., "Engineering Mathematics", Tata McGraw Hill Education Pvt. Ltd., 2017.

3.   Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.

References

1.   Anton H., Bivens I. and Davis S., "Calculus", Wiley, 10th Edition, 2016.

2.   Narayanan S. and Manicavachagom Pillai T.K., "Calculus" – Volume I and II, S. Viswanathan Publishers Pvt. Ltd.,

3.   Chennai, 2007.

4.   Srimantha Pal and Bhunia S.C, "Engineering Mathematics", Oxford University Press, 2015.

5.   Weir M.D. and Joel Hass, "Thomas' Calculus", 12th Edition, Pearson India, 2016.

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

Web References

1.   http://www.digimat.in/nptel/courses/video/111105035/L06.html

2.   https://nptel.ac.in/courses/111/104/111104085/

3.   https://www.youtube.com/watch?v=qN-klLYVeu4

	L	**T**	**P**	**C**

22PH201   **ENGINEERING PHYSICS**   **L T P C**
                                                                         3 0 0 3

Course Objective:

To enhance the fundamental knowledge in physics and its applications relevant to various streams of engineering and technology

Unit I   **LASER AND FIBRE OPTICS**   **9**

Lasers: population of energy levels, Einstein's A and B coefficients derivation – Semiconductor lasers homojunction and heterojunction – Industrial applications of laser. Fiber optics: principle, numerical aperture and acceptance angle – Types of optical fibres (material, refractive index, mode) – Fibre optic sensors: pressure and displacement.

Unit II   **PROPERTIES OF MATTER**   **9**

Elasticity: Stress – Strain – Hooke's law- Stress-strain diagram – Poisson's ratio – Twisting couple of wire – Torsional pendulum – Rigidity modulus of a wire – Beams – Bending of beams – Expression for bending moment – Cantilever – Depression of the loaded end of a cantilever – Young's modulus by uniform and non-uniform bending – I-shaped girders.

Unit III   **ULTRASONICS**   **9**

Introduction – Properties of ultrasonics – Production: Magnetostriction generator – Piezoelectric generator – Properties – Detection – Thermal and Piezoelectric methods, Determination of velocity of ultrasonic waves in liquids using acoustic grating – applications – SONAR – Non-destructive testing.

Unit IV   **QUANTUM PHYSICS**   **9**

Black body radiation – Planck's theory (derivation) – Wave particle duality – Concept of wave function and its physical significance – G.P Thomson experiment – Schrödinger's wave equation – Time independent and time dependent equation – Particle in a one-dimensional box.

Unit V   **CRYSTAL PHYSICS**   **9**

Space lattice – Unit cell – Bravais lattice – Miller indices – Interplanar spacing in cubic lattice – Atomic radius, Coordination number and Packing factor for simple cubic, body centered cubic, face centered cubic and Hexagonal close packed crystal structures – Crystal imperfections – Point and line defects.

Total: 45 Periods

Course Outcomes:

CO1 To have adequate knowledge on the concepts of fiber & Laser and their applications

CO2 Acquire knowledge on the basics of properties of matter and its applications

CO3 To acquire knowledge on the concepts of ultrasonics and their applications

CO4 To get knowledge on advanced physics concepts of quantum theory and its applications

CO5 To understand knowledge on the concepts of the types and importance of crystal systems

Text Books

1. Bhattacharya D.K. & Poonam, T., "Engineering Physics", Oxford University Press, First Edition, 2015

2. Gaur R.K. & Gupta S.L, "Engineering Physics", Dhanpat Rai Publishers, 2nd Edition 2012

3. Pandey B.K. & Chaturvedi S, "Engineering Physics", Cengage Learning India, 1st Edition, 2012

References

1. Halliday D, Resnick R. & Walker J. ―Principles of Physics. Wiley, 2015

2. Serway, R.A. & Jewett, J.W. ―Physics for Scientists and Engineers. Cengage Learning, 2010

3. Tipler P.A. & Mosca G. – Physics for Scientists and Engineers with Modern Physics. W.H.Freeman, 2007

4. Arthur Beiser "Concepts of Modern Physics" Tata McGraw Hill, New Delhi – 2015

5. M.N Avadhanulu "A Text Book of Engineering physics", S. Chand and Company ltd, New Delhi 2016

6. Dr. G. Senthilkumar "Engineering Physics – I", VRB publishers Pvt Ltd., 2020

Web References

1. https://rmd.ac.in/dept/snh/notes/1/PHY/unit1.pdf

2. http://www.gpcet.ac.in/wp-content/uploads/2018/09/UNIT-1-EP-PDF.pdf

3. https://edurev.in/studytube/Ultrasonics-Engineering-Physics/69c2e4ad-43c2-4b74-8512-603011fd403_t

4. http://en2k6.blogspot.com/2008/02/diffraction-of-light.html

22CY201	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

Course Objectives:

1. To make the students conversant with water quality parameters, related problems and water treatment techniques.

2. Develop knowledge on the basic principles of electrochemistry and understand the need for future energy requirements.

3. To categorize different fuels and to understand its calorific value.

4. To develop an understanding of basic concepts of phase rule and the purpose of making alloys.

5. To develop fundamental knowledge in the area of common engineering materials used in day to day life.

Unit I   WATER TREATMENT AND MANAGEMENT   9

Introduction – Water quality parameters: Definition and significance of pH , alkalinity, TDS, COD, BOD . Types of water- Hardness of water – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water –Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water – Reverse Osmosis.

Unit II   ELECTRO CHEMISTRY AND ENERGY DEVICES   9

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf by Poggendorff's compensation principle. Single electrode potential – Nernst equation – reference electrodes –types–Calomel electrode – electrolysis of water. Batteries and fuel cells: Types of batteries- Alkaline Battery –lead acid battery- lithium battery, Lithium Sulphur Battery. Fuel cell –H2 –O2 fuel cell- applications.

Unit III   PHASE RULE AND ALLOYS   9

Phase rule: Introduction, definition of terms with examples, one component system –water system – reduced phase rule – thermal analysis and cooling curves – two component systems – lead- silver system.

Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Ferrous and non-ferrous alloys – heat treatment of steel.

Unit IV   FUELS AND COMBUSTION   9

Fuel Introduction- classification of fuels-analysis of coal – proximate and ultimate (determination of carbon and hydrogen)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) – petroleum- manufacture of synthetic petrol (Bergius process)- knocking-octane number – diesel oil- cetane number – natural gas- compressed natural gas (CNG)- liquefied petroleum gases(LPG). Power alcohol and bio diesel. Combustion of fuels: introduction- calorific value – flue gas analysis (ORSAT Method).

Unit V   CHEMISTRY OF ENGINEERING MATERIALS   9

Engineering Plastics: Addition and Condensation Polymerization-difference. Preparation, Properties and uses of PVC, Teflon, Nylon 6,6 and Epoxy resins. Cement – Chemical Composition – classification – Manufacture – wet Process – setting and Hardening of cement. Nanomaterials:Basics of Nano Chemistry: Distinction between molecules, nanomaterials and bulk materials. Preparation of nanomaterials- laser ablation method and Chemical Vapour

Deposition(CVD). Application of Nanomaterials in medicine, agriculture, energy, electronics and catalysis.

Total Hours: 45 Periods

Course Outcomes:

CO1 To understand the basic parameters of water, different water softening   processes and effect of hard water in industries.

CO2   To develop an alternate energy source and to know the working of storage devices.

CO3   To understand industrial importance of phase rule and alloys

CO4   To summarize the various types of fuels and their real time applications in locomotives.

CO5   To synthesize polymers of commercial importance and additives for plastics.

Text Books

1. Dr.Veeraiyan., "Engineering Chemistry", VRB Publications Co , Chennai 2022.

2. Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2019.

References

1.   S. Bahl, G.D.Tuli and Arun Bahl "Essentials of Physical Chemistry:, S.Chand and Company Ltd, New Delhi, 2019.

2 Glasstone S., Electrochemistry, 5th edition, Maurice Press, USA, 2019.

3   P.C.Jain and Monica Jain, "Engineering Chemistry", 15th Edition, Dhanpat Rai Publishing Company (P),Ltd,New Delhi, 2018.

Web References

1   http://www.chemistry.wustl.edu/~edudev/LabTutorials/Water/FreshWater/hardness.html

2   https://en.wikipedia.org/wiki/Electrochemical_cell

3   http://www.brainkart.com/article/Phase-Rule-and-Alloys_6793/

4   https://nptel.ac.in/courses/103/105/103105110/

22CS301	**PROGRAMMING FOR PROBLEM SOLVING IN C**	**L**	**T**	**P**	**C**
		3	**0**	**2**	**4**

COURSE OBJECTIVES:

- To understand the constructs of C Language.
- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings

- To develop modular applications in C using functions
- To develop applications in C using pointers and structures
- To do input/output and file handling in C

UNIT I   BASICS OF CPROGRAMMING   9

Problem Solving- Algorithms- Pseudo code- Introduction to programming paradigms – Applications of C Language – Structure of C program – C programming: Data Types - Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions -- Input/output   statements,   Assignment statements –Decision making statements – Switch statement – Looping statements – Preprocessor directives – Compilation process

UNIT II   ARRAYS AND STRINGS   9

Introduction   to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

UNIT III   FUNCTIONSAND POINTERS   9

Modular programming – Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference.

UNIT IV   STRUCTURESAND UNION   9

Structure – Nested structures – Pointer and Structures – Array of structures – Self-referential structures – Dynamic memory allocation – Singly linked list – typedef – Union – Storage classes and Visibility.

UNIT V   FILEPROCESSING   9

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

Total Hours: 45

LIST OF EXPERIMENTS:

Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

- I/O statements, operators, expressions
- decision-making constructs: if-else, goto, switch-case, break-continue

- Loops: for, while, do-while
- Arrays: 1D and 2D, Multi-dimensional arrays, traversal
- Strings: operations
- Functions: call, return, passing parameters by (value, reference), passing arrays to function.
- Recursion
- Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers
- Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
- Files: reading and writing, File pointers, file operations, random access, processor directives.

Total Hours: 30

TOTAL: T(45), P(30) 75 PERIODS

COURSE OUTCOMES:

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

CO1: Demonstrate knowledge on C Programming constructs

CO2: Develop simple applications in C using basic constructs

CO3: Design and implement applications using arrays and strings

CO4: Develop and implement modular applications in C using function

CO5: Develop applications in C using structures and pointers.

CO6: Design applications using sequential and random access file processing.

TEXT BOOKS:

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition,2016.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education,2015.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education,2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications,2020.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education,1996.
4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C",Second
5. Edition, Oxford University Press, 2013.
6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1s Edition, Pearson Education,2013.

	L	**T**	**P**	**C**
	0	**0**	**4**	**2**

22PC201   **PHYSICS AND CHEMISTRY LABORATORY**

PHYSICS LABORATORY

Course Objectives:

1. To learn the proper use of various kinds of physics laboratory equipment.

2. To learn how data can be collected, presented and interpreted in a clear and concise manner.

3. To learn problem solving skills related to physics principles and interpretation of experimental data.

4. To determine error in experimental measurements and techniques used to minimize such error.

5. To make the student as an active participant in each part of all lab exercises.

List of Experiments (Any five experiments)

1. Determination of rigidity modulus of wire and moment of inertia of regular object – Torsion pendulum

2. Determination of Young's modulus of the material of a uniform bar (metre scale) by non-uniform bending method

3. Determination of wavelength of Laser and determination of acceptance angle in an optical fiber

4. Determination of thermal conductivity of a bad conductor – Lee's Disc method

5. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer

6. Determination of wavelength of mercury spectrum – spectrometer grating

7. Determination of band gap of a semiconductor

8. Determination of thickness of a thin wire – Air wedge method

9. Simple harmonic oscillations of cantilever.

10. Compact disc- Determination of width of the groove using laser.

11. Determination of Young's modulus of the material of a uniform bar (metre scale) by Uniform bending method

Total: 30 PERIODS

Course Outcomes:

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

CO1   Understand the functioning of various physics laboratory equipment.

CO2   Use graphical models to analyze laboratory data.

CO3   Use mathematical models as a medium for quantitative reasoning and describing physical reality.

CO4   Access process and analyze scientific information.

CO5   Solve problems individually and collaboratively.

11

CHEMISTRY LABORATORY

Course Objectives:

1. To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.

2. Develop knowledge on the basic principles of electrochemistry and understand the causes of corrosion.

3. To categorize different fuels and to understand its calorific value.

4. To develop an understanding of basic concepts of phase rule and the purpose of making alloys.

5. To develop fundamental knowledge in the area of polymer processing and all shaping operations used in the polymer industry.

List of Experiments (Any five experiments)

1. Determination of chloride content of water sample by argentometric method.

2. Determination of alkalinity in water sample.

3. Determination of total, temporary & permanent hardness of water by EDTA method.

4. Determination of DO content of water sample by Winkler's method.

5. Determination of strength of acids in a mixture using conductivity meter.

6. Conductometric titration of strong acid vs strong base using conductivity meter.

7. Conductometric precipitation titration of $BaCl_2$ and Na_2SO_4 using conductivity meter

8. Estimation of iron content of the given solution using potentiometer.

9. Estimation of iron content of the water sample using spectrophotometer (1, 10- Phenanthroline / thiocyanate method).

10. Determination of strength of given hydrochloric acid using pH meter.

11. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

Total: 30 PERIODS

Course Outcomes:

Upon completion of the course, the students should be able

CO1 To understand the basic facts and concepts in Chemistry

CO2 To understand the importance of Chemistry in daily life.

CO3 To develop a better understanding and reasoning of facts.

CO4 To skill-up for basic analytical tools.

CO5   To skill-up for various laboratory techniques used in pharmaceutical laboratories and chemical industries.

REFERENCES:

1. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New York 2001

2. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel"s Textbook of Practical organic chemistry", LBS Singapore 1994.

3. Jeffery G.H., Bassett J., Mendham J.and Denny vogel"s R.C, "Text book of quantitative Analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.

4. Kolthoff I.M. Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.

22TP701	SOFT SKILLS & APTITUDE – I	L	T	P	C
		0	0	2	1

Course Objective:

1. Introduce students to building blocks of Logical reasoning and Quantitative Aptitude

2. Train students on essential grammar for placements

3. Introduce students on scientific techniques to pick up skills

4. Provide an orientation for recruiter expectation in terms of non-verbal skills, and for how to build one"s career with placements in mind

Unit I   LESSONS ON EXCELLENCE   2

Skill introspection, Skill acquisition, consistent practice

Unit II   LOGICAL REASONING   11

Problem Solving - Critical Thinking- Lateral Thinking - Coding and Decoding – Series – Analogy - Odd Man Out - Visual Reasoning – Sudoku - puzzles - Attention to detail

Unit III   QUANTITATIVE APTITUDE   11

Addition and Subtraction of bigger numbers - Square and square roots - Cubes and cube roots - Vedic maths techniques - Multiplication Shortcuts - Multiplication of 3 and higher digit numbers – Simplifications – Comparing fractions - Shortcuts to find HCF and LCM - Divisibility tests shortcuts - Algebra and functions

Unit IV   RECRUITMENT ESSENTIALS   2

Resume Building - Impression Management

Unit V   VERBAL ABILITY   4

Nouns and Pronouns – Verbs - Subject - Verb Agreement - Pronoun - Antecedent – Agreement – Punctuations.

Total : 30 Periods

COURSE OUTCOMES:

CO1: Students will analyze interpersonal communication skills. public speaking skills.

CO2: Students will exemplify tautology, contradiction and contingency by logical thinking.

CO3: Students will be able to develop an appropriate integral form to solve all sorts of quantitative problems.

CO4: Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.

CO5: Students will be developed to acquire the ability to use English language with an error while making optimum use of grammar.

REFERENCE BOOKS:
R1: Quantitative Aptitude – Dr. R S Agarwal
R2: Speed Mathematics: Secret Skills for Quick Calculation - Bill Handley
R3: Verbal and Non – Verbal Reasoning – Dr. R S Agarwal
R4: Objective General English – S.P.Bakshi

22UH101	UNIVERSAL HUMAN VALUES II - UNDERSTANDING HARMONY	L	T	P	C
		2	1	0	3

1. OBJECTIVE:

The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

2. COURSE TOPICS:

The course has 28 lectures and 14 practice sessions in 5 modules:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of

14

aspirations of every human being with their correct priority

5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility

9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

10. Understanding the characteristics and activities of 'I' and harmony in 'I'

11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.

12. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Module 3: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

14. Understanding the meaning of Trust; Difference between intention and competence

15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Module 4: Understanding Harmony in the Nature and Existence - Whole existence asCoexistence

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and selfregulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
21. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony onProfessional Ethics

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

TOTAL HOURS: 45

3.READINGS:

3.1   Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books,

New Delhi, 2010

3.2   Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

3. The Story of Stuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

5. Small is Beautiful - E. F Schumacher.

6. Slow is Beautiful - Cecile Andrews

7. Economy of Permanence - J C Kumarappa

8.   Bharat Mein Angreji Raj - PanditSunderlal

9. Rediscovering India - by Dharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

11. India Wins Freedom - Maulana Abdul Kalam Azad

12. Vivekananda - Romain Rolland (English)

22EN103	DESIGN THINKING	L	T	P	C
		1	0	2	2

Course Objectives:

1. Study a problem from multiple perspectives

2. Learn how to frame the design challenge properly.

3. Learn how to ideate, prototype and Iterate solutions.

4. Learn the design thinking techniques for solving problems in various sectors.

5. Create innovative ideas, develop solutions for real-time problems.

MODEULE 1: Introduction to Design Thinking:

Introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, creativity in teams and their environments, design mindset. Introduction to elements and principles of design, 13 Musical Notes for Design Mindset, Examples of Great Design, Design Approaches across the world

MODULE 2: Empathy

17

Empathy tools- Interviews, empathy maps, emotional mapping, immersion and observations, customer journey maps, Step into customer's shoes, and brainstorming, Do's & Don'ts for Brainstorming, Individual activity- 'Moccasin walk', Ethical behavior: effects on self, society, understanding core values and feelings, negative sentiments and how to overcome them, definite human conduct: universal human goal, developing human consciousness in values, policy, and character.

MODULE 3: Defining the Problem

Defining the problem statement, creating personas, Point of View (POV) statements. Research-identifying drivers, information gathering, target groups, samples, and feedbacks. Idea Generation-basic design directions, Themes of Thinking, inspirations and references, brainstorming, inclusion, sketching and presenting ideas, idea evaluation, double diamond approach, analyze – four W's, 5 why's, "How Might We", Defining the problem using Ice-Cream Sticks, Metaphor & Random Association Technique, Mind-Map, ideation activity games - six thinking hats, million-dollar idea,

LIST OF EXPERIMENTS

1.   Role Play
2.   Brainstorming
3.   Presentation – Success Story of a Company
4.   Group Discussion
5.   Mock Interview
6.   Case Study
7.   Prototyping
8.   Innovative Product Design Ideas
9.   Empathy Mapping
10.   Customer Journey Maps

Total Hours: (Theory 15, Practical 30): 45 hours

Course Outcomes:

1 Develop a strong understanding of the design process and apply it in a variety of business settings

2. Analyze self and team to work in a multidisciplinary environment and exhibit empathetic behavior

3. Formulate specific problem statements of real time issues and generate innovative ideas

4. Apply critical thinking skills in order to arrive at the root cause from a set of likely causes

5. Demonstrate the ability to apply design thinking skills for evaluation of claims and arguments.

References

1. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.

2. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

		L T P C
22MA202	**NUMERICAL METHODS AND STATISTICS**	**3 1 0 4**

Course Objective:

1. To introduce the methods of solving algebraic and transcendental equations
2. To learn the techniques of numerical differentiation and integration.
3. To acquaint the knowledge of various methods of solving ordinary differential equations.
4. To learn the necessary and basic concepts of a statistical hypothesis testing for large and small samples.
5. To acquaint the knowledge of significance of Analysis of Variance.

Unit I   SOLUTION OF EQUATIONS   9+3

Solution of algebraic and transcendental equations – Fixed point iteration method – Newton-Raphson method – Solution of linear system of equations: Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel.

**Unit II   INTERPOLATION, NUMERICAL DIFFERENTIATION AND   9+3
                  INTEGRATION**

Lagrange's method of interpolation – Newton's forward and backward difference interpolation – Approximation of derivative using Newton's forward and backward differences – Single and double integration using Trapezoidal and Simpson's 1/3 rule.

Unit III   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   9+3

Single step methods: Taylor's series method – Euler's method – Fourth order Runge-Kutta method for solving first order differential equations – Multi step methods: Milne's and Adams-Bash forth predictor corrector methods for solving first order differential equations.

Unit IV   TESTING OF HYPOTHESIS   9+3

Statistical hypothesis – Large sample tests for single mean and difference of means – Small sample test: t-test and F-test for mean and variance – Chi-square test – Contingency table.

Unit V   DESIGN OF EXPERIMENTS   **9+3**

Analysis of variance - One way and two way classifications – Completely randomized design – Randomized block design – Latin square design – 2^2-factorial design.

Total : 60 Periods

Course Outcomes:

After completion of the course, the student will be able to

CO1   Solve linear and algebraic equations using numerical techniques.

CO2   Solve the differentiation and integration using numerical techniques.

CO3   Solve the differential equations with initial and boundary conditions using numerical methods.

CO4   Test the hypothesis for small and large samples.

CO5   Understand the concepts of Analysis of Variance.

Text Books:

1   Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science", 10th Edition, Khanna Publishers, New Delhi, 2015.

2   Johnson R.A., Miller I. and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education - Asia, 8th Edition,2015.

3   Douglas C. Montgomery, "Applied Statistics and Probability for Engineers", 3rd Edition, 2003.

References:

1   Burden R.L. and Faires J.D., "Numerical Analysis", 9th Edition, Cengage Learning, 2016.

2   Devore. J.L., "Probability and Statistics for Engineering and Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

3   Gerald. C.F. and Wheatley P.O. "Applied Numerical Analysis", Pearson Education - Asia, New Delhi, 2006.

4   Spiegel M.R., Schiller J. and Srinivasan R.A., "Schaum's Outlines on Probability and Statistics", Tata McGraw Hill Edition, 2004.

5 Walpole R.E., Myers R.H., Myers S.L. and Ye K., "Probability and Statistics for Engineers & Scientists", 8th Edition, Pearson Education - Asia, 2007.

Web References:
1. https://nptel.ac.in/courses/103/106/103106120/
2. https://drive.google.com/file/d/1QcFow6UwcS_yvGKCAhB07EGXFOj54jWO/view
3. https://www.youtube.com/watch?v=QQFIWwDA9NM

22PH203	PHYSICS FOR INFORMATION SCIENCE	L T P C 3 0 0 3

OBJECTIVES:

- To understand the essential principles of physics of semiconductor device and electron transport properties. Become proficient in magnetic and optical properties of materials and Smart materials.

UNIT I **SEMICONDUCTOR PHYSICS** **9**

Introuduction – Types of Semiconductor - Intrinsic Semiconductors – Energy band diagram – Direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – Extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Hall effect (n-type and p-type semiconductors) and its experiment.

UNIT II **SUPERCONDUCTING MATERIALS** **9**

Introduction – Superconducting phenomena – Properties of superconductors – Meissner effect - Isotope effect – Type I and Type II superconductor, High TC superconductor – Applications of superconductor – Magnetic levitation and SQUIDS – Superconducting computing – Quantum computing (Qualitative concepts).

UNIT III **MAGNETIC PROPERTIES OF MATERIALS** **9**

Magnetism in materials – Magnetic field and Induction – Magnetization - Magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – Antiferromagnetism – Ferromagnetism: origin and exchange interaction – Domain Theory - M versus H behaviour – Hard and soft magnetic materials – Magnetic storage devices: Magnetic tape, Magnetic hard

disk – Magnetic hard disk drive with GMR.

UNIT IV   **OPTICAL PROPERTIES OF MATERIALS**   **9**

Classification of optical materials – Carrier generation and recombination processes – Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) – Photo current in a P-N diode – Solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

UNIT V   **SMART MATERIALS**   **9**

Introduction – Metallic glass: properties, preparation and applications – Shape memory alloys (SMA): Characteristics, properties of Ni-Ti alloy and applications - Nano materials and its properties – Synthesis – Physical vapour deposition – Chemical vapour deposition techniques – Carbon nanotubes: Properties and applications .

TOTAL :45 PERIODS

OUTCOMES

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

- Acquire knowledge on basics of semiconductor physics and its applications in various devices
- Gain knowledge on superconducting materials and its applications
- Get knowledge on magnetic properties of materials and their applications in data storage
- Have the necessary understanding on the functioning of optical materials
- Understand the basics of smart materials and its applications

TEXT BOOKS

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

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

3. Kittel C. ―Introduction to Solid State Physics. Wiley, 2005.

REFERENCES

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

2. Hanson, G.W. ―Fundamentals of Nanoelectronics. Pearson Education, 2009.

3. Rogers B, Adams, J. & Pennathur S. ―Nanotechnology: Understanding Small Systems. CRC Press,

2014.

4. Dr. G. Senthil Kumar and Dr. S. Murugavel –Physics for Information Science, VRB Publishers, 2020

22ME301	ENGINEERING GRAPHICS	L	T	P	C
		3	0	0	3

Course Objective:
- To understand general theory of projection, with a focus on the use of orthographic   projection to represent three-dimensional objects in two-dimensional views.
- To understand the application of industry practices and techniques in graphics engineering.
- To apply auxiliary or sectional views to mostly represent engineered components.
- To get exposure to dimension and annotate of two-dimensional design drawings.
- To practice free hand 3D pictorial sketching to help with the visualization process and to communicate ideas graphically and efficiently.

Unit I   INTRODUCTION TO ENGINEERING DRAWING   9

Principles of Engineering Drawing / Graphics – Various Drawing Instruments – Conventions in Drawing-Dimensioning – Lettering practice – BIS Conventions. Construction of Conic Sections using Eccentricity Method-Cycloid, Epicycloid and Hypocycloid –construction of Involutes of a circle and square- Drawing of tangents and normal to the above curves

Unit II   ORTHOGRAPHIC PROJECTION, PROJECTION OF POINTS AND LINES   9

Orthographic Projection Rules – Conventions –First angle projection – Introduction to Third angle Projection, Projection of Points in all quadrants-Projection of Lines parallel and inclined to both planes(First angle Projection only)

Unit III   PROJECTION OF PLANES AND SOLIDS   9

Projection of regular planes - Plane inclined to both reference planes-Projections of regular solids - prisms and pyramids inclined to both planes

Unit IV   SECTION AND DEVELOPMENT OF SOLIDS   9

Sectioning of solids- prisms, pyramids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.-Development of lateral surfaces of simple and truncated

solids –cylinders and cone

Unit V   ISOMETRIC AND PERSPECTIVE PROJECTION   9

Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Simple and combination of two solid objects in simple vertical positions-Perspective projection of prisms, pyramids and cylinders by visual ray method.

Total Hours: 45 Periods

Course Outcomes:

CO1:   Understanding of basic concepts of conic sections, cycloids and involutes of various shapes of engineering products.

CO2: Drawing the projection of points, lines and orthographic views of engineering components.

CO3: Projection of planes and projection of solids at different positions.

CO4: Visualization of sectional views of solids and development of surfaces.

CO5: Drawing isometric projection and perspective views of an object/solid.

CO6: Application of the concepts of drawing in practice.

Text Books

1.Natarajan C and Sundaramoorthy R, "Engineering Graphics", Tata McGraw-Hill Publishers, 2020.

2.Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.

3.Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Ltd, 2015.

Reference Books

1.Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2009.

2.Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

3.Luzzader, Warren.J. And Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

4.N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

5.Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

22EC304	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives

1. To develop an understanding of the fundamental laws ,elements of DC circuits and principle of operation of electrical machines.

2. To develop an understanding of the fundamental parameters of AC circuits and principle of operation of AC electrical machines.

3 .To introduce basic semiconductor devices, their characteristics and application

4. To acquire knowledge on basic digital electronic gates and on combinational and sequential circuits.

5. To understand the working of various instruments and equipments used for the measurement of various parameters like voltage, current, power, phase.

UNIT I DC CIRCUITS & DC MACHINES

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law – Faraday's Law-Kirchhoff's Laws -Simple problems

DC Machines: Principles of operation and characteristics of DC motor and generator-types.

UNIT II AC CIRCUITS & AC MACHINES

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – (Simple problems only)

AC Machines: Principles of operation and characteristics of Transformers, Alternators, three phase and single phase induction motors.

UNIT III ANALOG ELECTRONICS

Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics& Applications – Bipolar Junction Transistor& UJT.

UNIT IV DIGITAL ELECTRONICS

Review of number systems, binary codes, gray code, BCD code, Excess 3 code– representation of logic functions-SOP and POS forms, K-map representations – minimization using K maps (Upto four variable problems).

UNIT V SPECIAL ELECTRONIC DEVICES

Introduction to Op-Amp- Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp –Summing amplifier.CRO, Function generator, multimeter.

Course Outcomes:

CO1 Apply the knowledge of basic circuital laws and simplify the dc networks using reduction techniques and demonstrate and characterize DC machine.

CO2 Apply the knowledge of parameters of AC circuits and demonstrate and characterize AC machine.

CO3 Demonstrate the operating principle and output characteristics of pn junction diodes, zener diode, BJT, rectifiers and different diode circuits.

CO4 Able to solve different binary codes, employ the minimization technique and prepare various combinational and sequential circuits.

CO5 Able to operate the various instruments and equipments used for the measurement of various parameters like voltage, current, power, phase.

TEXT BOOKS:

1.Electronic devices and circuits 5th Edition by S Salivahanan, N Suresh Kumar 2022

2. Millman's Electronic Devices and Circuits | 4th Edition

3.Electric Machinery Fundamentals by Stephen J.Chapman

REFERENCE BOOKS:

1.   Basic Electrical Engineering U.A.Bakshi|V.U.Bakshi

2.   Basic Electrical and Electronics Engineering By R.K. Rajput

WEB REFERENCES:

1.   https://www.electrical4u.com

22AD301	INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND DATA SCIENCE	L	T	P	C
		3	0	0	3

Course Objective:

1. Understand and what is AI, its applications and use cases and how it is transforming

ourlives.

2. Explain terms like Machine Learning, Deep Learning and Neural Networks.

3. Describe several issues and ethical concerns surrounding AI.

4. To impart knowledge about Data science.

5. To give understanding of various data science processing techniques.

Unit I   INTRODUCTION   9

Introducing AI - Impact and Examples of AI - Some Applications of AI -Cognitive Computing -Issues and Concerns around AI - AI and Ethical Concerns - AI and Bias - The evolution and future of AI

Unit II   BASICS ON NEURAL NETWORKS AND DEEP LEARNING   9

Neural Networks Basics - Binary Classification - Logistic Regression - Logistic Regression Cost Function - Gradient Descent – Derivatives - Deep L-layer Neural Network - Forward Propagation in a Deep Network - Building Blocks of Deep Neural Networks

Unit III   INTELLIGENT AGENTS   9

Agents and Environment, The Concept of Rationality: Performance measures, Rationality, Omniscience, learning, and autonomy, Agent architectures, The Nature of Environments: Specifying the task environment, Properties of task environments, The Structure of Agents.

Unit IV   DATA SCIENCE FUNDAMENTALS   9

Data Science Process - Obtaining Data Motivation - Raw and Processed Data - Components of Tidy Data - Reading from MySQL - Reading from HDF - Reading from The Web - Subsetting and Sorting - Summarizing Data - Creating New Variables - Reshaping Data.

Unit V   EXPLORATORY DATA ANALYSIS   9

Exploratory Graphs – Clustering – Types of clustering - Hierarchical Clustering and K-Means Clustering (Basics) - Dimension Reduction

Total : 45 Periods

Course Outcomes:

CO1   Compare AI with human intelligence and traditional information processing, and discuss its future

CO2   Analyze the algorithms selection in Deep learning.

CO3   Apply and evaluate intelligent agents to given real time dataset.

CO4   Understand the techniques in data science process.

CO5   Apply data analysis mechanism for business requirements.

Text Books
1   Artificial Intelligence:A Modern Approach, by S.Russell and P.Norvig, Prentice Hall, Fourth Edition, 2021.
2   Artificial Intelligence: Foundations of Computational Agents, by David L. Poole and Alan K. Mackworth Cambridge University Press, 2010.

References
1   Deepak Khemani, Artificial Intelligence,, Tata McGraw Hill Education 2013

Web References

1   https://www.coursera.org/learn/data-cleaning

2   https://www.coursera.org/learn/exploratory-data-analysis

22ME302	ENGINEERING PRACTICES LABORATORY	L 0	T 0	P 4	C 2

Course Objectives:

• To understand the basic manufacturing process like welding, moulding, fitting, assembling, smithy and carpentry works.

• To practice using of basic manufacturing hand tools and equipments.

• To understand and practice in linear measuring devices.

• To understand the working of basic electrical and electronic equipments.

• To analyze the electrical wiring concepts.

List of Experiments

GROUP A (CIVIL & MECHANICAL)

I) CIVIL ENGINEERING PRACTICE   **12**

S. No	Name of the Experiments

1   Buildings

    1. Study of plumbing and carpentry components of residential and industrial buildings and Safety aspects.

2   Plumbing Works:

    1. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers and elbows in household fittings.

    2. Study of pipe connections requirements for pumps and turbines.

    3. Preparation of plumbing line sketches for water supply and sewage works.

    4. Hands-on-exercises: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

    5. Demonstration of plumbing requirements of high-rise buildings.

3   Carpentry using Power Tools only:

    1. Study of the joints in roofs, doors, windows and furniture.

    2. Hands-on-exercises: Wood work, joints by sawing, planning and cutting.

II) MECHANICAL ENGINEERING PRACTICE   **18**

S. No	Name of the Experiments

1   Welding:

    1. Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.

    2. Gas welding practice

2   Basic Machining:

    1. Simple Turning and Taper turning

    2. Drilling Practice

3   Sheet Metal Work:

    1. Forming & Bending:

    2. Model making – Trays and funnels.

    3. Different type of joints

4   Machine assembly practice:

1. Study of Pumps
2. Study of air conditioner
3. Study of Computer Assembly

5   Demonstration on:

1. Smithy operations, upsetting, swaging, setting down and bending.
2. Foundry operations like mould preparation for gear and step cone pulley.
3. Fitting – Exercises – Preparation of square fitting and V – fitting models

GROUP B (ELECTRICAL AND ELCTRONICS)

III) ELECTRICAL ENGINEERING PRACTICE   **12**

1   Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2   Fluorescent lamp wiring.
3   Stair case wiring
4   Measurement of electrical quantities – voltage, current, power & power factor in R Circuit.
5   Measurement of energy using single phase energy meter.
6   Measurement of resistance to earth of electrical equipment.

IV) ELECTRONICS ENGINEERING PRACTICE   **18**

1   Study of all types of Active and Passive Electronic components and equipment's.
2   Measurement of resistance value and its tolerances using colour coding method.
3   Measurement of AC signals parameters using CRO.
4   Study of logic gates AND, OR, EXOR and NOT.
5   Generation of Clock Signal using IC 555 timer.
6   Soldering and De-soldering using discrete components.
7   Measurement of ripple factor of HWR and FWR.

Total: 60 Periods

Course Outcomes:

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

CO1: Exposure to various manufacturing process like smithy, carpentry, assembling, welding and different machines.

CO2: Understanding the various hand tools used in the basic mechanical engineering workshop

sections-smithy, carpentry, assembling and welding.

CO3: Developing various shapes through different manufacturing methods.

CO4: Exposure to the working of electrical equipments.

CO5: Analysis of the working concepts of various electronic components and their parameters.

CO6: Analysis of the parameters of timer circuit & rectifier circuit.

List of Equipment/Tools

Sl. No	Description of Equipment	Quantity
	CIVIL	
1	Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	5 Sets.
2	Carpentry vice (fitted to work bench)	10 Nos.
3	Standard wood working tools	5 Sets
4	Sheet metal working tools	5 Sets
5	Models of industrial trusses, furniture joints	5 each
6	Rotary Hammer	2 Nos.
7	Circular Saw	2 Nos.
8	Planer	2 Nos.
9	Hand Drilling Machine	2 Nos.
10	Jigsaw	2 Nos.

Sl. No	Description of Equipment	Quantity
	MECHANICAL	
1	Arc welding transformer with cables and holders.	5 Nos
2	Welding booth with exhaust facility	5 Nos
3	Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 sets
4	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit	2 Nos
5	Centre lathe	2 Nos.

6	Hearth furnace	2 Nos
7	Anvil	2 Nos
8	Smithy tools	2 Sets.
9	Moulding table	2 Nos
10	foundry tools	2 Sets.
11	Power Tool: Angle Grinder	2 Nos
12	Study-purpose items: centrifugal pump, air-conditioner	1each.

Sl. No	Description of Equipment	Quantity
	ELECTRICAL	
1	Tube light setup	5 Nos
2	Fluorescent Lamp setup	10 Nos
3	Switches (Single & Two way)	7 Nos
4	3 Pin Socket	5 Nos
5	Resistive Load	5 Nos
6	Volt Meter	15 Nos
7	Ammeter	21 Nos
8	Watt Meter	14 Nos
9	Megger/ Earth tester	1 No
10	Emergency Lamp Setup	1 No
11	Single Phase Multifunction Meter	1 No
12	AC Single phase Watt-hour Meter	6 Nos
13	Stop watch Timer	2 Nos
14	Iron Box	3 Nos
15	Telephone	1 No
16	Ceiling Fan	1 No
17	60W Light	10 Nos
18	Indicator	4 Nos

| 19 | Insulation Tape | 10 Nos |
| 20 | Wire Cutter | 2 Nos |

Sl. No	Description of Equipment	Quantity
	ELECTRONICS	
1	Regulated Power Supply (Single)	3 Nos
2	CRO	5 Nos
3	Function generator	5 Nos
4	IC Trainer kit	5 Nos
5	Resistors	100 Nos
6	Capacitors	100 Nos
7	Soldering gun	5 Nos
8	IC555	20 Nos
9	Transistor	10 Nos
10	PCB	10 Nos
11	Soldering Paste	10 Nos
12	Wire Cutter	1 No
13	Bread Board	15 Nos
14	PN Diode	30 Nos
15	ICs (AND, OR, NOT, EXOR, NAND gate)	15 Nos

22TP702	Soft Skill and Aptitude II	L 0	T 0	P 2	C 1

Course Objectives:

1. Solve Logical Reasoning questions of easy to intermediate level

2. Solve Quantitative Aptitude questions of easy to intermediate level

3. Solve Verbal Ability questions of easy to intermediate level

33

Unit I Logical Reasoning 8

Word group categorization questions - Cryptarithmetic - Data arrangements – Blood relations.

Unit II Quantitative Aptitude 12

Ratio and Proportion: Ratio, Proportion, Variation, Simple equations, Problems on Ages, Mixtures and alligations - Percentages, Simple and Compound Interest: Percentages as Fractions and Decimals, Percentage Increase / Decrease, Simple Interest, Compound Interest, Relation Between Simple and Compound Interest - Number System.

Unit III Verbal Ability 10

Essential grammar for placements: Prepositions, Adjectives and Adverbs, Tenses, Forms and Speech and Voice, Idioms and Phrasal Verbs, Collocations, Gerund and Infinitives - Reading Comprehension for placements: Types of questions, Comprehension strategies - Articles, Prepositions and Interrogatives: Definite and Indefinite Articles, Omission of Articles, Prepositions, Compound Prepositions and Prepositional Phrases, Interrogatives - Vocabulary for placements: Exposure to solving questions of Synonyms, Antonyms, Analogy, Confusing words and Spelling correctness

Total Hours:30

Course Outcome:

CO1: Students will analyze and critique logical reasoning, including situations for whichthe student will recognize underlying assumptions and make reasonable assumptions.

CO2: Students will be able to make decisions with mathematical, statistical, and quantitative information.

CO3: Students would have obtained a multitude of opportunities resulting in the refinement of his/her language skills and the ability to use the skills for effective communication.

REFERENCE BOOKS:

R1: How to Prepare for Quantitative Aptitude for the CAT- Arun Sharma

R2: How to Prepare for Logical Reasoning for CAT

R3: Objective General English – S.P.Bakshi

22MC805 **HERITAGE OF TAMILS** **L T P C**

1 0 0 1

UNIT I LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management

Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE   3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS   3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS   3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE   3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும்– கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல்துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல்துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

35

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: 38 Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

		L	**T**	**P**	**C**
22NC101	**NCC GENERAL AND NATIONAL INTEGRATION**	**1**	**0**	**0**	**1**

Course Objective:

- Know about the history of NCC, its organization and incentives of NCC cadets for their career prospects.
- Understand the concept of national integration and its importance.
- Understand the practices of health and hygiene and importance.
- Be motivated to serve the nation by joining the Armed forces.
- Appreciate grace and dignity in the performance of foot drill.

Unit I   ORGANIZATION OF NCC   3

NCC General - Aims and Objectives - Motto of NCC - Organization - training and NCC song - History of NCC - Incentives of NCC - Duties of NCC cadets.

Unit II   NATIONAL INTEGRATION   3

Introduction to National Integration - Major religions in India - Importance and Necessity of National integration - Unity in diversity - Factors affecting National integration - Threats to national security - Benefits of National Integration.

Unit III   HEALTH AND HYGIENE   3

Structure and function of a human body - health and sanitization - Infectious and contagious diseases and its prevention.

Unit IV   ARMED FORCES AND GENERAL SERVICE KNOWLEDGE   3

Basic Organization of Armed Forces - Army, Navy and Airforce - Equivalent Ranks in Defence services - History of the Armed Forces - modes of entry in Indian Armed forces.

Unit V   FOOT DRILL   3

Basics of drill - File formation -Basics of foot drill - word of command - Savdhan - Vishram - Aram se - Thahine mud - Baye mud - piche mud - Thej chal - Tham - kadham thal.

Total : 15 Periods

Course Outcomes:

CO1: Imbibe the conduct of NCC cadets. And exposure of NCC organization

CO2: Respect the diversity of different Indian cultures.

CO3: Provide good health by hygiene living.

CO4: Understand about Indian Armed forces and effective contribution.

CO5: Provide and follow the different word of command

Text Books

1   NCC cadet Guide (SD/SW) Army.

2   NCC cadet Guide (SD/SW) Airforce.

3   ANOs Guide (SD/SW) by DG NCC, Ministry of Defence, New Delhi

4   Digital Forum App 1.0 & 2.0, by DG NCC DG NCC, Ministry of Defence, New Delhi

References:

1   UGC and AICTE circulated syllabus.

		L T P C
22MA204	**DISCRETE MATHEMATICS**	**3 0 0 3**

Course Objective:
   1. To learn the mathematical logic and reasoning.

   2. To acquaint the basic concepts of combinatorics.

   3. To acquaint the knowledge of applying graph theory to solve real-world problems.

   4. To familiarize the fundamental concepts of groups.

   5. To introduce the concepts and significance of lattices and Boolean algebra which

     are widely used in computer science and engineering.

Unit I   MATHEMATICAL LOGIC   9
Propositional logic – Propositional equivalences - Predicates and quantifiers – Rules of inference.

Unit II   COMBINATORICS   9
Mathematical induction – The pigeonhole principle – Permutations and combinations –
Recurrence relations – Solving linear recurrence relations – Generating functions.

Unit III   GRAPHS   9
Basic Definitions – Some Special Graphs – Matrix Representation of Graphs – Graph
isomorphism - Eulerian and Hamiltonian Graphs.

Unit IV   GROUPS   9
Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism –
Normal subgroup and cosets – Lagrange's theorem.

Unit V   LATTICES AND BOOLEAN ALGEBRA   **9**

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra**.**

Total : 45 Periods

Course Outcomes:

After completion of the course, the student will be able to

CO1   Understand the concepts needed to test the logic of a program.

CO2   Solve recurrence relations.

CO3   Understand various Graph models.

CO4   Understand the concepts and properties of algebraic structures such as groups.

CO5   Understand the concepts of lattices and Boolean algebra.

Text Books:

  1   Rosen K.H., "Discrete Mathematics and its Applications with Combinatorics and Graph Theory", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2015.

  2   Tremblay J.P. and Manohar R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

References:

  1   Grimaldi R.P., "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007.

  2   Lipschutz S. and Mark Lipson., "Discrete Mathematics - Schaum's Outlines", Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

  3   Koshy T., "Discrete Mathematics with Applications", Elsevier Publications, 2006.

Web References:

1. https://nptel.ac.in/courses/111/107/111107058/

2. https://nptel.ac.in/courses/106/102/106102064/

3. http://www.infocobuild.com/education/audio-video-courses/mathematics/DiscreteMathematics-CMI/lecture-38.html

4. http://www.infocobuild.com/education/audio-video-courses/mathematics/DiscreteMathematics-CMI/lecture-44.html

		L	T	P	C
22EC308	**APPLIED DIGITAL LOGIC DESIGN**	**3**	**0**	**2**	**4**

Course Objective:

- To design digital circuits using simplified Boolean functions

- To analyze and design combinational circuits

- To analyze and design synchronous and asynchronous sequential circuits

- To understand Programmable Logic Devices
- To write HDL code for combinational and sequential circuits

Unit I INTRODUCTION   9

Introduction of digital systems - Number system - number bases and base conversions, and binary codes Boolean algebra, application of Boolean algebra in minimization of Boolean expressions - Boolean minimization using K-map and Quine McCluskey method - Introduction to Verilog.

Unit II COMBINATIONAL LOGIC CIRCUITS   9

Introduction - Analysis Procedure - Binary Adder –Subtractor, Binary Multiplier – Decoders – Encoders – Multiplexers – Demultiplexers - Priority Encoder - Code Converters - Magnitude Comparator.

Unit III SYNCHRONOUS SEQUENTIAL LOGIC   9

Introduction to Sequential Circuits - Storage Elements: Latches, Flip Flops - RS - using - Latch NAND and NOR Gates- Truth Tables. RS, JK , T and D Flip Flops - Truth and Excitation Tables - Conversion of Flip Flops.

Unit IV   REGISTERS AND COUNTERS   9

Registers - Shift Registers - Ripple Counters - Synchronous Counters - Ring Counter - Johnson Counter - Finite state machine - state graphs and tables - Reduction of state table and state assignments.

Unit V MEMORY AND PROGRAMMABLE LOGIC   9

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

List of Experiments:
1.   Verification of Boolean Theorems using basic gates.

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

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

4.   Design and implement combinational circuits using MSI devices:

- •   4 – bit binary adder / subtractor
- •   Parity generator / checker
- •   Magnitude Comparator
- •   Application using multiplexers

5.   Design and implement shift-registers.

6.   Design and implement synchronous counters.

7. Design and implement asynchronous counters.

8. Coding combinational circuits using HDL.

9. Coding sequential circuits using HDL

Course Outcomes:

After completion of the course, the student will be able to

CO1: Implement simplified combinational circuits using basic logic gates

CO2: Simplify Boolean functions using KMap

CO3: Design and Analyze Combinational and Sequential Circuits

CO4: Implement designs using Programmable Logic Devices

CO5: Write HDL code for combinational and Sequential Circuits

Total: 75 Hours
Theory 45 Hours, Practical 30 Hours

Text Books

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

References

1. G. K. Kharate, Digital Electronics, Oxford University Press, 2010

2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.

3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013

4. Donald D. Givone, Digital Principles and Design‖, Tata Mc Graw Hill, 2003.

Web References

1. https://onlinecourses.nptel.ac.in/noc23_ee29

22CS302	JAVA PROGRAMMING	L	T	P	C
		3	0	2	4

Course Objective:

1. To understand Object Oriented Programming concepts and basic programming features of Java

2. To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.

3. To know the principles of packages, inheritance and interfaces.

4. To develop a java application with threads and generics classes.

5. To define exceptions and use I/O streams

6. To study about database connectivity

Unit I   INTRODUCTION TO JAVA   9

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors Methods -Access specifiers - Static members- Java Doc comments.

Unit II   INHERITANCE, INTERFACES AND PACKAGES   9

Overloading- Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding - Dynamic binding, – Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces – Multiple inheritance – Default methods – Static methods.

Unit III   THREADS AND EXCEPTION HANDLING   9

Thread - Thread life cycle and methods, Runnable interface- Inter Thread Communication- Suspending –Resuming, and Stopping Threads –Multi-threading - Exception handling with try-catch-finally – Nested try-catch – User defined Exception

Unit IV   I/O, GENERICS, STRING HANDLING   9

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

Unit V   COLLECTIONS, JDBC   9

Collection framework – List – Set – Map – Comparing and Sorting- Regex – JDBC – The need – JDBC API – JDBC Driver – Database Connection – Database Operations – ProcessingResults- Memory Management and Garbage Collection.

Theory : 45 Hours

List of Experiments

S. No Name of the Experiments

1   Programs using class and methods using Java

2   Implementation of Inheritance using Java

3   Inheritance via Interface and Abstract class

4   Programs on Package implementations

5   Implementation of Java Applications using Generic collections

6   Demonstration of IO Streams in Java

7   Demonstration of User Defined Exception handling in Java

8   Implementation of multi-threading in Java

9   Programs using collection framework

10   Mini Project using Database connectivity

Practical: 30 Hours
Total hours :75 Hours

Course Outcomes:

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

CO1   Apply the concepts of classes and objects to solve simple problems

CO2   Develop applications using various OOP Concepts

CO3   Apply exception handling mechanisms and multithreaded model to solve real world
problems.

CO4   Build Java applications with I/O packages, string classes, Collections and generics
concepts

CO5   Integrate the java concepts to build application using back end.

Reference Books:
1   Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New
Delhi, 2019

2 Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2018.

3 KEN ARNOLD, Java Programming Language, Addison Wesely, 2000

4 John R Hubbard, Programming with Java, Tata Mcgraw Hill, 1998

Web References

1 https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0131933845400207362
64_shared/overview

2 https://onlinecourses-archive.nptel.ac.in/noc19_cs07

3 https://trainings.internshala.com/java-traininghttps://dzone.com/articles/top-5-java-online-courses-for-beginners

22CS401	DATA STRUCTURES	L	T	P	C
		3	0	2	4

Course Objective:

1. To learn about the implementation and applications of basic data structure , Array

2. To impart a thorough understanding of linear data structures such as stack,
   queues and their applications.

3. To impart a thorough understanding of non-linear data structures such as
   trees, graphs and their applications.

4. To study about various sorting and searching techniques and their applications.

5. To learn various hashing techniques

Unit I   INTRODUCTION AND ARRAYS   7

Basic terminology – classification of data structures -Data structure - operations – Abstract Data Types (ADT) – Complexity of Algorithm - Linear Array – Arrays as ADT Representation - Searching: Sequential (linear) search and Binary Search - Record structures – representation.

Unit II   LINEAR DATA STRUCTURE   11

List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists –Polynomial operations- Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion - Function Calls – Queue ADT – Operations – Circular Queue – Priority Queue – DeQueue – Applications of Queues

Unit III   NON LINEAR DATA STRUCTURE - TREES   **9**

Trees – Terminologies -Binary Trees - representation – Tree Traversal techniques –
Expression tree - Binarysearch tree – Operations - AVL Trees – B Trees – B+ trees - Heaps.

Unit IV   NON LINEAR DATA STRUCTURE - GRAPHS   **9**

Introduction – Terminology – Representation - Graphs Traversal - Breadth first search- Depth
first search – Topological sort - Shortest-path algorithm- Dijkstra‚s Algorithm – Minimum
spanning trees – Prim's and Kruskal's algorithms

Unit V   HASHING AND SORTING   **9**

Hashing- Separate Chaining - Open Addressing –Double Hashing - Rehashing – Extendible
Hashing - Sorting – Bubble Sort – Insertion Sort - Selection Sort – Quick Sort – Merge Sort –
Heap Sort – Radix Sort – Shell Sort

Theory : 45 Hours

List of Experiments

S. No Name of the Experiments

1   Implementation of LIST ADT using Array and Linked Representation

2   Array and Linked list Implementation of Stack ADT

3   Array and Linked list Implementation of Queue ADT

4   Implementation of Tree Traversal techniques

5   Implementation of Binary Search Trees

6   Implementation of Graph Representation and Traversal algorithm – BFS and DFS

7   Implementation of Topological Sorting

8   Implementation of Minimum Spanning Tree algorithms

9   Implementation of Shortest path algorithms

10   Implementation of Searching Algorithms

11   Implementation of sorting algorithms

Practical: 30 Hours
Total: 75 Hours

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

CO1: Implement linear data structures

CO2: Implement applications using Stacks and Linked lists.

CO3: Implement Binary Search tree and AVL tree operations.

CO4: Implement graph algorithms

CO5: Analyze the various searching, sorting and hash algorithms.

Text Books

1   Mark Allen Weiss, ―Data Structures and Algorithm Analysis in C‖, 2nd Edition, Pearson Education,1997

2   Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, ―Data Structures and Algorithms‖, Pearson Education, 2009

References

1   Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, ―Fundamentals of Data Structures inC‖, Second Edition, University Press, 2008

2   Robert Sedgewick, Kevin Wayne, ―Algorithms‖, Fourth Edition, Pearson Education, 2011

3   Steven S.Skiena, ― The Algorithm Design manual‖, Second Edition, Springer, 2012

4   Noel Kalicharan, ―Data Structures in C‖,2015

Web References

1   https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-introduction-to-algorithms-sma-5503-fall-2005/video-lectures/

2   http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html

3   https://www.cs.usfca.edu/~galles/visualization/Algorithms.html

22CS402	COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

Course Objective:

1   To study the concepts of the basic structure and operation of a digital computer.

2   To impart knowledge about the operation of the arithmetic unit including the algorithms &implementation addition, subtraction, multiplication & division

3   To know in detail the different types of control and the concept of pipelining.

4   To know the hierarchical memory system including cache memory and virtual memory.

5   To acquire knowledge about the diverse ways of communicating with I/O devices and standard I/O Interfaces

Unit I   BASIC STRUCTURE OF COMPUTERS   9

Functional units-Basic operational concepts-Bus structures-Software-performance-Memory locations and addresses- Memory operations- Instruction and instruction sequencing- Addressing modes- Basic I/O operations

Unit II   ARITHMETIC OPERATIONS   9

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

Unit III   BASIC PROCESSING UNIT AND PIPELINING   9

Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control - Micro programmed control - Pipelining: Basic concepts - Data hazards - Instruction hazards -Data path and control considerations - Superscalar Operation. Case Studies.

Unit IV   MEMORY SYSTEM & I/O ORGANIZATION   9

Basic concepts - Semiconductor RAM - ROM - Speed - Size and cost - Cache memories – Performance Considerations-Virtual memory - Memory management requirements - Secondary storage devices. Accessing I/O devices - Programmed Input/output Interrupts - Direct Memory Access- Buses - Interface circuits - Standard I/O Interfaces (PCI, SCSI, and USB), IOP - CPU Communication.

Unit V   INSTRUCTION LEVEL PARALLELISM   9

RISC processors - Characteristics of RISC processors, RISC vs CISC, Classification of Instruction Set Architectures -Introduction – Parallel Processing - Instruction Level Parallelism and its Exploitation - Concepts and Challenges - Multithreading: Using ILP Support to Exploit Thread-Level Parallelism.

Total : 45 Periods

Course Outcomes:

CO1 Identify the basic structure of a digital computer and instruction sets with addressing modes

CO2 Comprehend the arithmetic operations of binary number system

CO3 Recognize the organization of the basic processing unit and examine the basic concepts of pipe-lining

CO4 Infer the processor concepts by introducing multi-core, cluster , shared and distributed architecture concepts

CO5 Explicate the standard I/O interfaces and peripheral devices

CO6 Determine the performance of different types of memory

Text Books

1 William Stallings, Computer Organization and Architecture – Designing for Performance‖, 8th Edition, Pearson Education, 2009.

2 John P. Hayes, Computer Architecture and Organization, 3rd Edition, Tata McGraw Hill, 2002.

References

1 Carl Hamacher, Zvonko Vranesic and Safwat Zaky, ―Computer Organization and Embedded Systems, 6th Edition, Tata McGraw Hill, 2002

2 David A. Patterson and John L. Hennessy, ―Computer Organization and Design: The Hardware/Software interface‖, 3rd Edition, Elsevier, 2005.

3 V.P. Heuring, H.F. Jordan, ―Computer Systems Design and Architecture, 2nd Edition, Pearson Education, 2004.

4 Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill reprint 2011

Web References

1 https://www.edx.org/course/computation-structures-2-computer-architecture

2 https://learn.saylor.org/course/CS301

3 https://www.classcentral.com/subject/algorithms-and-data-structures

4 https://www.classcentral.com/tag/computer-architecture

22CS403	**CLEAN CODING AND DEVOPS**	L	T	P	C
		2	0	2	3

Course Objective:

1. Understand about the clean code and best programming practices.

2. Understand the importance of comments in the applications

3. Understand & install different tools used in DevOps stack

4. Explain the benefits of DevOps and how various industries are benefitting

5. Explain how to automatically rollback a release if it is failed

Unit I INTRODUCTION TO CLEAN CODING 10

Coding principles introduction-Bad and Good code-marshalling and unmarshalling-Names and Functions-distinct names-Defining meaningful context-Usage of domain and function names-Usage of exceptions and its error code names/descriptions. Right comments and types of formatting- Clean and bad comments-Vertical and horizontal formatting-Objects and data structures-Data abstraction-Data and object antisymmetric-Data transfer objects

Unit II INTRODUCTION TO DEV-OPS

10

An overview about DevOps,-Why it is needed? how it is different from traditional IT & Agile - DevOps Principles,- DevOps Lifecycle - An overview about CI/CD pipeline and various tools-setup a complete CI/CD pipeline from scratch using DevOps tools - How DevOps is used in various technologies/industries.

Unit III ADVANCED DEV-OPS 10

An overview of advanced DevOps concepts - Automatic Rollback & Provisioning, Scalability, Clustering & Infrastructure as Code An overview of Cloud computing - -Why DevOps on cloud - Cloud services - Setup a CI/CD pipeline in Cloud – Dockers.

Total: 30 Periods

Lab Experiments:

1. Implementation of Velocity & The Jobs of Delivery

2. Testing Stack

3. Execution of Feature Flags and the Blue/Green Pattern

4. The Medium/Integration Test

5. Creating a Culture of Experimentation

Total: 30 Periods

Course Outcomes:

CO1: Understand the importance of comments in the applications.

51

CO2: Understand the data and object antisymmetric

CO3: Understand Cloud computing concepts

CO4: Explain why DevOps on cloud and various DevOps services available on IBM Cloud

CO5: Understand and explain secure release pipeline.

Text Books

1 DevOps: A Software Architect's Perspective by Ingo M. Weber, Len Bass, and Liming Zhu

22MC806	TAMILS AND TECHNOLOGY	L T P C
		1 0 0 1

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING **3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும்– கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல்துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல்துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) 54

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

22TP703	**Soft Skill and Aptitude III**	**L T P C**
		0 0 2 1

Course Objectives:

1. Solve Logical Reasoning questions of easy to intermediate level

2. Solve Quantitative Aptitude questions of easy to intermediate level

3. Solve Verbal Ability questions of easy to intermediate level

4. Display good writing skills while dealing with essays

Unit I Logical Reasoning   **9**

Clocks - Calendars - Direction Sense - Cubes - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency

Unit II Quantitative Aptitude   **12**

Time and work: Work with different efficiencies, Pipes and cisterns, Work equivalence, Division of wages - Time, Speed and Distance: Basics of time, speed and distance, Relative speed, Problems based on trains, Problems based on boats and streams, Problems based on races - Profit and loss, Partnerships and averages: Basic terminologies in profit and loss - Partnership - Averages - Weighted average

Unit III Verbal Ability   **7**

Sentence Correction: Subject-Verb Agreement, Modifiers, Parallelism, Pronoun-Antecedent Agreement, Verb Time Sequences, Comparisons, Prepositions, Determiners – Sentence Completion and Para-jumbles: Pro-active thinking, Reactive thinking (signpost words, root words, prefix suffix, sentence structure clues), Fixed jumbles, Anchored jumbles.

Unit IV Writing skills for placements   **2**

Essay writing: Idea generation for topics, Best practices, Practice and feedback

Total Hours : 30

Course Outcome:

CO1: Students will avoid the various fallacies that can arise through the misuse of logic.

CO2: Students would opt for alternate methods to solve the problems rather than conventional methods.

CO3: Students will heighten their awareness of correct usage of English grammar in writing and speaking

CO4: Students will be concise and clear, using professional language for placements.

REFERENCE BOOKS:

R1: A New Approach To Reasoning Verbal & Non-Verbal By B.S. Sijwali

R2: How to prepare for data interpretation for CAT by Arun Sharma.

R3: How to Crack TEST OF REASONING in all competitive examinations by Jaikishan and Premkishan.

R4: Quantitative Aptitude for Competitive Examinations - Dr. R.S. Aggarwal, S. Chand

R5: Word Power Made Easy by Norman Lewis

R6 Six weeks to words of power by Wilfred Funk

22NC102	SOCIAL SERVICES AND COMMUNITY DEVELOPMENT	L	T	P	C
		1	0	0	1

Course Objectives:
1. Acquire the knowledge and active participate in social service and community development activities.
2. Understand the concept of disaster management and role of NCC cadets in disaster management..
3. Understand the concept thinking and reasoning process..
4. Understand about maps and use of bearing and service protector
5. Know about the principles of flight and Aerofoil structure and ATC procedures.

Unit I SOCIAL SERVICES AND COMMUNITY DEVELOPMENT 3

Basics of social services and its need - Rural development programs - Contribution of youth towards social welfare - NGOs in social services Swach bharath Abhiyan - Social evils - Mission Indra danush - Beti bacho Beti pado - Digital awareness - Constitution day.

Unit II DISASTER MANAGEMENT 3

Organization of Disaster management - Types of emergencies - Natural and manmade disasters - fire service and firefighting - prevention of fire.

Unit III PERSONALITY DEVELOPMENT 3

Introduction to personality development - public speaking Intra and Inter personal skills - self awareness - critical thinking - Decision making and problem solving.

Unit IV MAP READING 3

Types of maps - conventional signs - scales and Grid system - relief and contour gradient - cardinal points - Types of North - types of bearing and use of service protector - Prismatic compass and its uses - setting of map - finding North and own position.

Unit V PRINCIPLES OF FLIGHT AND AIRMANSHIP 3

Introduction to principle of flight - Forces acting on the aircraft - Angle of attack - Angle of incidence -

Newton's - law of motion - Bernauli's theorem and Venturi effect - Aerofoil - Airfield layout - ATC (Air Traffic Control) - circuit procedures - Aviation medicine.

Course Outcome:

CO1: Perform the social services on various occasions for better community and social life

CO2: Appreciate the need and requirement for disaster management and NCC role in disaster management activities.

CO3: Define thinking, reasoning, critical thinking and creative thinking

CO4: Use of bearing and service protector and locate the places and objects on the ground.

CO5: Understand the principles of flight and Aerofoil structure.

Text Books :
1. NCC cadet Guide (SD/SW) Army

2. NCC cadet Guide (SD/SW) Air force.

3. ANOs Guide (SD/SW) by DG NCC, Ministry of Defence, New Delhi

4. Digital Forum App 1.0 & 2.0, by DG NCC DG NCC, Ministry of Defence, New Delhi

Reference:

1. UGC and AICTE circulated syllabus.

22MA207	**PROBABILITY AND QUEUEING THEORY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective:
1. To acquaint the knowledge of random variable.
2. To learn the nature of standard distributions in discrete and continuous cases.
3. To introduce the concept of two dimensional random variables and its characteristics.
4. To acquaint the concept of random processes and classifications.
5. To familiarize queueing models and its performance measures.

Unit I   PROBABILITY AND RANDOM VARIABLES   9
Axioms of probability – Conditional probability – Total probability – Baye's Theorem – Random Variables – Probability mass functions – Probability Density functions – Properties – Moments – Moment generating functions and their properties.

Unit II   STANDARD DISTRIBUTIONS   9
Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Normal distributions and their properties.

Unit III   TWO DIMENSIONAL RANDOM VARIABLES   9

Joint distribution – Marginal and conditional distribution – Covariance – Correlation and Regression – Transformation of Random Variables.

Unit IV   RANDOM PROCESSES   9

Classification – Stationary process – Markov process - Markov Chain – Pure Birth and Death process - Poisson process.

Unit V   QUEUEING MODELS   9

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

Total : 45 Periods

Course Outcomes:
After completion of the course, the student will be able to
   CO1   Understand the nature of random variables and its properties.
   CO2   Understand the nature of standard distributions in discrete and continuous cases.
   CO3   Understand the Phenomenon of two dimensional random variables and its characteristics.
   CO4   Know about random processes, Markov chains and transition probabilities.
   CO5   Acquire skills in categorize the characteristics of queueing models.

Text Books:
   1   Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistics", 11th revised Edition, Sultan Chand & Sons, 2007.
   2   Veerarajan T.,"Probability and Random Processes", Tata McGraw Hill, Third reprint 2009.

References:
   1   Roy D. Yates and David J Goodman, "Probability and Stochastic Processes-A friendly Introduction for Electrical and Computer Engineers", John Wiley & Sons, Inc., 2011.
   2   Miller. S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications", Academic Press, 2004.
   3   Trivedi K.S, "Probability and Statistics with reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.
   4   Gross D., Shortle J.F., Thompson J.M. and Harris C.M. "Fundamentals of Queuing Theory", Wiley, Student 4th Edition, 2014.
   5   Siva Ramakrishna Dass,"Probability and Statistics", Viji Academy, 2014.
   6   Douglas C. Montgomery, "Applied Statistics and Probability for Engineers", 3rd Edition, 2003.

Web References:
   1.   https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-spring-2015/probability/tp12-1/vertical-1f097d8a0a33/bayes-theorem/
   2.   https://nptel.ac.in/courses/111/105/111105042/
   3.   https://www.youtube.com/watch?v=xGkpXk-AnWU

		L	**T**	**P**	**C**
22IT401	**DATABASE MANAGEMENT SYSTEMS**	**3**	**0**	**2**	**4**

Course Objective:

1. Course introduces the fundamental concepts and techniques necessary for the understanding and practice of the design and implementation of database applications.

2. Students are expected to acquire practical skills for the design and implementation of database applications. In particular, they should master entity-relationship design and SQLdata definition and manipulation.

3. Students should understand the theory of query languages, integrity constraints and normalization.

4. Students should learn about the internal storage structures using different file and indexingtechniques.

5. Students should understand the practical differences between relational and non-relationaldatabase management systems.

6. Students should be able to understand state-of-art database technology, to easily followtechnological developments.

Unit I   INTRODUCTION   9

Database-System Applications - Purpose of Database Systems - View of Data: Data abstraction, Instances & Schemas, Data models – Database Languages: Data Manipulation Language, Data Definition Language – Database Engine – Database and Application Architecture – Database Users and Administrators, Database vault, Database firewalls.

Unit II   RELATIONAL MODEL AND SQL   9

Structure of Relational Databases -Database Schema- Keys- Schema Diagrams- Relational Query Languages-The Relational Algebra- SQL Data Definition - Basic Structure of SQL Queries - Basic Operations - Set Operations - Null Values -Aggregate Functions - Nested Sub queries-Join Expressions-Views-Functions and Procedures, Triggers.

Unit III   RELATIONAL DATABASE DESIGN   9

The Entity-Relationship Model- Complex Attributes- Mapping Cardinalities-Integrity Constraints- Primary Key- Removing Redundant Attributes in Entity Sets- Reducing E-R Diagrams to Relational Schemas- Features of Good Relational Designs- Decomposition Using Functional Dependencies - Normal Forms.

Unit IV   INDEXING AND TRANSACTION MANAGEMENT   9

RAID- Database Storage Architecture-File Organization-Organization of Records in Files-Indexing- Ordered Indices-B + Tree Index Files - B+ Tree Extensions - Hash Indices-Transactions-ACID Properties-Concurrency Control-Lock based protocols-Timestamp based protocols

Unit V   ADVANCED DATABASES   9

Multimedia Databases-Spatial Databases-NOSQL Databases, Types, MongoDB – Datatypes, Creating, Updating and Deleting Documents, Querying the database.

LIST OF EXPERIMENTS / EXERCISES:

1. Demonstrate Data Definition Language and integrity constraints.

2. Demonstrate DML, DCL and TCL commands.

3. Execute nested and sub queries in SQL.

4. Demonstrate Join operations in SQL.

5. Create Views, Index and perform SQL operations in it.

6. Demonstrate the concept of looping using PL/SQL statements.

7. Implement Cursors and its operations.

8. Implement Triggers and its operations.

9. Develop Procedures and Functions to perform operations in SQL.

10. Embed SQL queries in high level languages.

11. Mini project with crystal reports

Lecture: 45, Practical: 30, Total: 75

COURSE OUTCOMES:

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

CO1 Determine various keys and sketch a suitable schema for a given application.

CO2 Design an ER model and write SQL queries for a queries for a given scenario.

CO3 Design relational database using normalization methods for a given application.

CO4 Apply the concept of concurrency control in transaction processing.

CO5 Execute queries using concepts of embedded query languages and real world problems using database concepts

TEXT BOOK:

1. Silberschatz Abraham, Korth Henry F. and Sudarshan S., "Database System Concepts", 7th Edition, McGraw Hill, New York, 2019.

REFERENCES:

1. R. Elmasri and S. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson Education, 2011.

2. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, 3nd Edition, McGraw Hill, 2003.

3. Thomas M. Connolly and Carolyn E. Begg, "Database Systems - A Practical Approach to Design, Implementation and Management", Fifth edition, Pearson Education, 2010.

4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

WEB REFERENCES:

1. Infosys Foundation Program: Module 2

2. https://onlinecourses.nptel.ac.in/noc17_cs33/course

3. http://www.db-book.com

4. http://nptel.ac.in/courses/IIT-MADRAS/Intro_to_Database_Systems_Design

5. http://www.iitg.ernet.in/awekar/teaching/cs344fall11/

6. www.w3schools.com/sql/

	L	T	P	C
22CS404 **ANALYSIS OF ALGORITHMS**	3	0	0	3

Course Objective:

1. To understand and apply the algorithm analysis techniques.
2. To critically analyze the efficiency of alternative algorithmic solutions for the same problem
3. To understand different algorithm design techniques
4. To apply appropriate method to solve a given problem.
5. To understand the limitations of Algorithmic power.

Unit I   **INTRODUCTION TO ALGORITHM ANALYSIS**   **9**

Introduction to Algorithm Analysis – Notion of Time and Space Complexity – Algorithm efficiency – Asymptotic Notations – Recurrence Relations – Solving Recurrence equations - Iteration Method, Recurrence Tree Method and Master's Theorem - Mathematical analysis for

Recursive and Non-recursive algorithms - Empirical analysis of algorithm - P, NP and NP-Complete Problems. Brute Force Approach: General Approach – Algorithm Analysis – Applications

Unit II **DIVIDE-AND-CONQUER & DECREASE-AND-CONQUER** **9**

Divide And Conquer: General Strategy –Analysis of algorithm - Merge sort - Quick sort - Strassen‟s Matrix Multiplication – Multiplication of Large Integers – Convex Hull and Closest pair problem. Decrease and Conquer:Introduction - General Method – Analysis - Insertion sort - Topologicalsort – Binary Search – Fake-Coin Problem – Interpolation Search.

Unit III **DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE** **9**

Dynamic Programming: Introduction - Principle of Optimality – General Approach for problem solving - Analysis – Coin Changing Problem - Optimal Binary Search Trees - Warshall‟s and Floyd‟s Algorithm - Knapsack Problem and Memory functions. Greedy Technique: Greedy Approach Introduction - Analysis of algorithm - Examples: Container Loading Problem – Prim‟s and Kruskal‟s Algorithm - Dijkstra‟s Algorithm - Huffman Trees.

Unit IV **ITERATIVE IMPROVEMENT** **9**

The Simplex Method – The maximum Flow problem – Min Cut Max Flow Theorem and Proof – Maximum Matching in a Bipartite graph – Stable marriage Problem

Unit V **BACKTRACKING & BRANCH AND BOUND** **9**

Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem- Graph Coloring problem- Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem.

Total : 45 Periods

Course Outcomes:
CO1 Analyze the time and space complexity of algorithms and Solve recurrence equations.

CO2 Design algorithms using Divide and Conquer Strategy and Decrease and conquer strategy

CO3 Compare Dynamic Programming and Divide and Conquer Strategies.

CO4 Solve Optimization problems using Greedy strategy and iterative improvement techniques

CO5 Design efficient algorithms using Back Tracking and Branch Bound Techniques for solving problems.

CO6 Classify computational problems into P, NP, NP-Hard and NP-Complete.

Text Books

1 Anany Levitin "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education Limited, 2014

2 Parag H.Dave, Himanshu B.Dave, " Design and Analysis of Algorithms", Pearson Education, 2008.

3 Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 2009

4 Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.

References

1 Sandeep Sen and Amit Kumar, "Design and Analysis of Algorithms – A Contemporary Perspective" , Cambridge University Press, 2019

2 S.K.Basu, "Design Methods and Analysis of Algorithms", Second Edition, PHI Learning Private India Limited, 2013

3 Harsh Bhasin, ―Algorithms Design and Analysis‖, Oxford university press, 2016

4. John Kleinberg, Eva Tardos, "Algorithm Design", Pearson Education, 2009

Web References

1 http://nptel.ac.in/

2 https://online.stanford.edu/courses/cs161-design-and-analysis-algorithms

3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-designand- analysis-of- algorithms-spring-2015/lecture-videos/

4. https://www.classcentral.com/course/edx-algorithm-design-and-analysis-8520

		L	**T**	**P**	**C**
22AD402	**PYTHON PROGRAMMING FOR DATA SCIENCE**	**2**	**0**	**4**	**4**

Course Objective:
- To study the fundamental programming aspects of python.
- To learn about various packages used for data analysis.

Unit I   BASICS OF PYTHON   10

Introduction – Setting working directory – Creating and saving, File execution, clearing console, removing variables from environment, clearing environment – variable creation – Operators – Data types and its associated operations – sequence data types – conditions and branching – Functions-Virtual Environments.

Unit II   PYTHON DATA STRUCTURES, PACKAGES   10

List – Tuples- Set – Dictionary – Its associated functions - File handling - Modes– Reading an dwriting files - Introduction to Pandas – Series – Data frame – Indexing and loading – Data manipulation – Merging – Group by – Scales – Pivot table – Date and time.

Unit III   PACKAGES FOR DATA ANALYSIS   10

Numpy – 1D and 2D numpy – Associated operations –Broadcasting - Linear algebra and related operations – Indexing and other operations – Matplotlib – scatterplot – line plot – bar plot – histogram – box plot – pair plot – Case study on regression and classification.

Theory : 30 Periods

List of Experiments:
1. Programs using Control and conditional structures.
2. Programs using functions.
3. Python program to demonstrate list, tuples, set and dictionary.
4. Program to work with Pandas series and Data frame.
5. Program for Merging and Aggregation in Pandas Library
6. Program in Python to Manipulate, Aggregate and Analyze data using Numpy .
7. Program in Python to perform statistical analysis on Data
8. Python program to create various plots.
9. Develop an application to analyze Stock Market Data using Python tools.
10. Mini Project

Practical: 60 Periods

Total: 90 Hours

Course Outcomes:

CO1 Develop applications using various data structures in Python.

CO2 Examine the process for importing and exporting the data.

CO3. Apply appropriate data collection and pre-processing methods.

CO4. Identify different data analysis Techniques suitable for a given applications

CO5. Demonstrate data visualization techniques for Data Analysis

Text Books

1 Alex Campbell , "Python for Data Science: Clear and Complete Guide to Data Science and Analysis with Python", Feb 202

2 William McKinne , "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython ",2nd Edition, O"Reilly, 2017.

References

1 John Paul Mueller and Luca Massaron , "Python for Data Science For Dummies", 2nd Edition,

2 Jake VanderPlas ,"Python Data Science Handbook: Essential Tools for Working with Data" , O"Reilly Publication,

Web References

1 https://www.udacity.com/course/programming-for-data-science-nanodegree--nd104

2. https://www.udemy.com/course/complete-data-science-training-with-python-for-data-analysis/

3 https://in.coursera.org/professional-certificates/ibm-data-science

22CS405	**OPERATING SYSTEMS**	L	T	P	C
		3	0	2	4

Course Objective:

1. To understand the basic concepts of operating system.

2. To learn the mechanisms of OS to handle processes, thread, scheduling mechanism and Inter Process communication.

3. To learn memory management strategies in contemporary OS.

4. To know about file structure and disk structures.

5. To appreciate the emerging trends in operating systems.

Unit I   INTRODUCTION   7

Computer System - Elements and organization; Operating System Overview - Objectives and Functions - Evolution of Operating System; Operating System Structures – Operating System Services - User Operating System Interface - System Calls – System Programs - Design and Implementation - Structuring methods.

Unit II   PROCESS MANAGEMENT AND SCHEDULING   11

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Threads - Multithread Models – Threading issues; Process Synchronization - The Critical-Section problem - Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization - Monitors; Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

Unit III   MEMORY MANAGEMENT   9

Logical Versus Physical Address Space, Basics of linking and loading, Swapping, Contiguous Memory Allocation, Virtual Memory - Paging–Structure of the Page Table, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing–Memory Mapped Files, Allocating Kernel Memory.

Unit IV   STORAGE MANAGEMENT   9

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

Unit V   VIRTUAL MACHINES AND MOBILE OS   9

Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS - iOS and Android

Thoery: 45 Periods

List of Experiments

S. No   Name of the Experiments

1   Installation of operating system, Install any guest operating system (Linux) using VMware

2   Illustrate UNIX commands and Shell Programming

3   Process Management using System Calls : Fork, Exit, Getpid, Wait, Close

4   Programs using the various CPU Scheduling Algorithms

5   Program using Deadlock detection methods.

6   Program using Deadlock avoidance methods.

7   Paging Technique

8   Memory Allocation Methods.

9   Page Replacement Algorithms

10   Disk scheduling algorithms

Practical: 30 Periods
Total: 75 hours

COURSE OUTCOMES:

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

CO1 : Analyze the structure and basic architectural components of OS.

CO2: Discuss and implement UNIX Commands.

CO3 : Implement various CPU Scheduling Algorithms.

CO4 : Compare and contrast various Memory Allocation Methods.

CO5 : Implement various Disk Scheduling Algorithms.

CO6: Define File Organization and File Allocation Strategies.

Text Books

1   Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts"‖,
     10th Edition, John Wiley and Sons Inc., 2018.

2   Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022 New Delhi

References

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

2   William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition,

Prentice Hall, 2018

3   Achyut S.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 2016

Web References

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

2   https://onlinecourses.nptel.ac.in/noc20_cs04/

3   https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/pages/

22AD403	DATA VISUALIZATION	L	T	P	C
		2	0	2	3

Course Objective:

1. To give overview of descriptive and inferential statistics.

2. To provide basics of R and Python.

3. To manipulate and visualize data using R, python and Watson Studio.

4. To focus on plots using Matplotlib and seaborn.

5. To analyze data using various visualization tools.

6. To create maps in python using folium.

Unit I	INTRODUCTION TO STATISTICS

10

Data collection methods – Descriptive Statistics: Mean, Median, Mode – Inferential Statistics :Random Variables, Probability Distributions, Normal Distribution, Sampling and Sampling Distribution.

Unit II	VISUALIZATION USING R

10

Overview of R - Descriptive data analysis using R – Data manipulation with R – Data visualization with R - R studio installation - Python scripiting basics-Pandas (text data, date time columns, indexing and selecting data, groupby ,Merge/join datasets)

Unit III	VISUALIZATION USING PYTHON	10

Data Visualization tools in python – Basic plots using Matplotlib - Specialized Visualization tools using Matplotlib - Advanced Visualization tools using Matplotlib-Seaborn functionalities – Spatial visualization and analysis in python in folium – Usage of Seaborn functionalities – Case studies.

List of Experiments (Indicative)

1. Program to do the descriptive analysis using R

2. Program to do data manipulation.

3. Program for data visualization operations for builtin data set using R

4. Program to implement the Exploratory Data Analysis(EDA) for a data set

5. Consider your own data set and do the following visualization using tableu tool

   a) Line graph /with style

   b) Bar Graph

   c) Histogram

   d) Scatter plot

   e) Pie chart

6. Program to create maps with markers and Chropleth maps with Folium

Total: 30 Periods

Course Outcomes:

CO1: Differentiate descriptive and inferential statistics.

CO2: Use R to do statistics and to visualize data.

CO3: Visualize analyzed data using IBM Watson Studio.

CO4: Familiar with python scripts used for visualization.

CO5: Use advance visualization tool and sea born functionalities.

Text Books

1   Wes McKinney, ―Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython‖ , Oreilly, 2011.

2   Andreas C. Muller, Sarah Guido, ―Introduction to Machine Learning with Python: A Guide for Data Scientists‖, Oreilly, 2016

22TP704	**Soft Skill and Aptitude IV**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Objectives:

1. Solve Logical Reasoning questions of easy to intermediate level

2. Solve Quantitative Aptitude questions of easy to intermediate level

3. Solve Verbal Ability questions of easy to intermediate level

4. Crack mock interviews with ease

5. Be introduced to problem-solving techniques and algorithms

Unit I Logical Reasoning 5

Logical Connectives - Syllogisms - Venn Diagrams: Interpretation - Venn Diagrams - Solving

Unit II Quantitative Aptitude 8

Logarithm - Arithmetic Progression - Geometric Progression - Geometry – Mensuration - Coded inequalities - Quadratic Equations - Permutation, Combination: Fundamental Counting Principle, Permutation and Combination, Computation of Permutation, Circular Permutations, Computation of Combination – Probability.

Unit III Verbal Ability 2

Critical Reasoning: Argument – Identifying the Different Parts (Premise, assumption, conclusion), Strengthening statement, Weakening statement, Mimic the pattern.

Unit IV Recruitment Essentials 3

Cracking interviews - demonstration through a few mocks - Sample mock interviews to demonstrate how to crack the: HR interview, MR interview, Technical interview - Cracking other kinds of interviews: Skype/ Telephonic interviews, Panel interviews, Stress interviews - Resume building – workshop: A workshop to make students write an accurate resume

Unit V Problem solving and Algorithmic skills 12

Logical methods to solve problem statements in Programming - Basic algorithms introduced

Total Hours: 30

Course Outcome:
CO1: Students will excel in the complex reasoning.

CO2: Students will be proficient to create and verify their own conjectures.

CO3: Imbibe effective relevant knowledge in English.

CO4: Students will identify different life skills required in personal and professional life.

CO5: Students will develop skills in ideation, innovation in algorithmic thinking, and be able to apply them in problem solving.

REFERENCE BOOKS:

R1: Logical Reasoning and Data Interpretation for CAT by Nishit K. Sinha

R2: A Modern Approach To Verbal Reasoning by R S Aggarwal.

R3: Quantitative Aptitude for Competitive Examinations (5th Edition) - Abhjit Guha

R4: Verbal Ability & Reading Comprehension by Ajay Singh

R5: Computer Programming for Beginners: Fundamentals of Programming Terms and Concepts – Nathan Clark

22MC802 ENVIRONMENTAL SCIENCE AND ENGINEERING

L T P C
3 0 0 0

Course Objectives:

1. To analyse possible patterns and relationships between a biotic or abiotic factor and a biological system.
2. To identify the pollutants, their sources, transport mechanisms and respective controls.
3. To identify the methods for recycling, recovery and reuse of the materials considered to be waste.
4. To give in-depth information about the laws, the national policy, Acts related to environmental issue.
5. To define the size, distribution of population and social awareness.

Unit I ECOSYSTEM DYNAMICS AND BIODIVERSITY 9

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – food chains, food webs and ecological pyramids. Introduction to biodiversity— value of biodiversity: consumptive use, productive use .India as a mega-diversity nation – hot-spots of biodiversity - endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Unit II ENVIRONMENTAL POLLUTION 9

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution -environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act -Issues and possible solutions - global warming, acid rain, – role of an individual in prevention of pollution.

Unit III NATURAL RESOURCES 9

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing,

effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – role of an individual in conservation of natural resources.

Unit IV   SOCIAL ISSUES AND THE ENVIRONMENT   9

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources -Resettlement and rehabilitation of people; its problems and concerns, case studies -environmental ethics.

Unit V   HUMAN POPULATION AND THE ENVIRONMENT   9

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

Total : 45 Periods

Course Outcomes:

CO1 To understand the value of these ecosystems to humans and to animals and plants.

CO2 To identify the major pollutants and abatement devices for environmental management and sustainable development.

CO3 To explain how we can use natural resources in sustainable manner.

CO4 To explain knowledge of various acts and laws and will be able to identify the industries that are violating these rules.

CO5 To estimate the population - economic growth, energy requirement and demand.

Text Books

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

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

References Books:

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

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

3. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

Web References:

1. https://www.conserve-energy-future.com

2. https://.livescience.com/topics/pollution/4

22NC103	**LEADERSHIP QUALITIES AND CAMP ACTIVITIES**	L	T	P	C
		1	0	0	1

Course Objectives:
1. Identify the leadership traits.
2. Understand importance of Environmental awareness and conservation.
3. Acquiring awareness about the basic obstacles and weapon system in training
4. Use of terrain effectively for concealment, camouflage, indicates landmarks and give field signals.
5. Obtain Knowledge about Airframes, types of wings and instruments for flying.

UNIT I LEADERSHIP DEVELOPMENT 3

Introduction to Leadership - Leadership traits - indicators - motivation - ethics and Moral values - Honor code - Basics of OLQ (Officer like Qualities).

UNIT II ENVIRONMENTAL AWARENESS 3

Water conservation - Sources of water - water cleaning management - Pollution - Types of pollution - Energy sources - Solar, wind, Tidal - Renewable and none renewable energy conversion - waste management - Tree plantation.

UNIT III OBSTACLES AND WEAPON TRAINING 3

Introduction to weapons - Types of rifles - SLR, .22, INSAS etc., - Firing - Types of Firing position – short range firing - Principles of firing - Holding, Aiming and Triggering. Understanding about obstacle training - Analysis and Process of obstacle training. Precautions carrying on training.

UNIT IV FIELD CRAFT AND BATTLE CRAFT 3

Introduction to FCBC - Observation, camouflage and concealment. Judging distance - Description of ground - Recognition, description and indication of land mark and target.

UNIT V AIR FRAMES AND INSTRUMENTS **3**

Aircraft control surfaces - Types of Air frames - Types of wings and plane. Landing gear - Basic Flight Instruments - Air speed Indicator (ASI) - Altimeter -Artificial Horizon (AH).

Course Outcome:

CO1: Imbibe leadership qualities.

CO2: Contribute in environmental awareness and conservation activities.

CO3: Understand and execute obstacles course and uses of weapons.

CO4: Observe surroundings in better way.

CO5: Understand the design of Aircraft, control surfaces and Airspeed indicator.

Text Books :

1. NCC cadet Guide (SD/SW) Army

2. NCC cadet Guide (SD/SW) Air force.

3. ANOs Guide (SD/SW) by DG NCC, Ministry of Defence, New Delhi

4. Digital Forum App 1.0 & 2.0, by DG NCC DG NCC, Ministry of Defence, New Delhi

Reference:

1. UGC and AICTE circulated syllabus.

| | | | **L** | **T** | **P** | **C** |

22CS406 **AUTOMATA AND COMPILER DESIGN**

L T P C
3 1 0 4

Course Objective:

1. To have an understanding of Computational languages.

2. To have a knowledge of regular languages and context free languages and its properties.

3. To design DFA & NFA with different conversion techniques.

4. To understand, design and implement a lexical analyzer and parser.

5. To implement code generation schemes.

6. To Understand Lex and YACC tools.

UNIT I   **FINITE MACHINE AND REGULAR EXPRESSION**   **10**
Finite State Machine-Deterministic finite automation-Non Deterministic finite automation-
Conversion of NFA into DFA- Minimization of FSM- Regular sets-regular expressions - Closure
properties of regular sets.

UNIT II   **CONTEXT FREE GRAMMAR**   **12**
Context Free Grammars- Normal Forms, Chomsky Normal Form (CNF)-Greibach Normal Form
(GNF) - Pushdown automata (PDA) – Languages of a PDA - Equivalence of PDA's and CFG's.

UNIT III   **LEXICAL AND SYNTAX ANALYSIS**   **13**
Phases of compiler – Lexical Analyzer-LEX – Role of Lexical Analyzer – Input Buffering –
Specification of Tokens- Role of Parser – Grammars – Error Handling – Context free grammars –
Writing a grammar –Top Down Parsing- Bottom-Up parsing:- Shift-Reduce parsers- Construction of
SLR parser tables and parsing- Error Handling and Recovery in Syntax Analyzer-YACC.

UNIT IV   **INTERMEDIATE CODE GENERATOR**   **13**
Syntax Directed Translations: Syntax-directed definitions- Translation Schemes-Intermediate
Languages: Syntax Tree-Three Address Code-Types and Declarations- Translation of Expressions-
Run-time environments: Source language issues-storage organization- storage allocation strategies.

UNIT V   **CODE GENERATOR**   **12**

Principal Sources of Optimization – Peep-hole optimization – DAG- Optimization of Basic Blocks
Global Data Flow Analysis – Efficient Data Flow Algorithm-peephole optimizations-basic blocks-
DAG"s.

TOTAL:60 Periods

Course Outcomes:

CO1: Design the Context free grammar and Push down automata for a context freeLanguage

CO2 : Apply the pumping lemma properties to Regular and Context Free Languages

CO3 : Design a lexical analyzer to identify the tokens in a program

CO4 : Construct the different Translation Schemes.

CO5 : Analyze various code optimization techniques.

Text Books

1. John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, **"**Introduction to Automata Theory, Languages, and Computation", 3rd Edition, 2021.

2. A. V. Aho et al, "Compilers: Principles, techniques, & tools", Second Edition, PearsonEducation 2nd Edition, 2021.

3. K. D. Cooper and L. Torczon, "Engineering a compiler", Morgan Kaufmann, 2004

References Books

1 D.M. Dhamdhere, "Systems programming and operating systems", Tata McGraw Hill Education Private Limited, 2011.

2 Peter Linz, Susan H. Rodger, "An Introduction to Formal Languages and Automata", Jones& Bartlett books, 7th Edition, 2023.

Web References

1. https://swayam.gov.in/nd1_noc19_cs79

2. https://web.stanford.edu/class/archive/cs/cs103/cs103.1168/

3. http://infolab.stanford.edu/~ullman/focs.html

4. https://courses.cs.washington.edu/courses/cse401/

22IT403	**COMPUTER NETWORKS**	**L**	**T**	**P**	**C**
		3	**0**	**2**	**4**

COURSE OBJECTIVES:
- To understand the concept of layering in networks.
- To know the functions of protocols of each layer of TCP/IP protocol suite.
- To visualize the end-to-end flow of information.
- To learn the functions of network layer and the various routing protocols
- To familiarize the functions and protocols of the Transport layer

UNIT I   INTRODUCTION AND APPLICATION LAYER   10
Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model –Introduction to Sockets - Application Layer protocols: HTTP – FTP – Email protocols (SMTP - POP3 - IMAP - MIME) – DNS – SNMP - Software Defined Network, Types of SDN Network. Basics of 5G networks

UNIT II   TRANSPORT LAYER   9

Introduction - Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control - Congestion Control - Congestion avoidance (DECbit, RED) – SCTP – Quality of Service

UNIT III   NETWORK LAYER   7

Switching : Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP, RARP, ICMP, DHCP

UNIT IV   ROUTING   7

Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing – OSPF
– Path-vector routing - BGP - Multicast Routing: DVMRP – PIM.

UNIT V   DATA LINK AND PHYSICAL LAYERS   12

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11)

Physical Layer: Data and Signals - Performance – Transmission media- Switching – Circuit Switching - Wi-Fi, Wi-Max, Bluetooth, Zigbee, and NFC.

Theory : 45 Periods

PRACTICAL EXERCISES:

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like: a) Echo client and echo server b) Chat
4. Simulation of DNS using UDP sockets.
5. Use a tool like Wireshark to capture packets and examine the packets
6. Write a code simulating ARP /RARP protocols.
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of Distance Vector/ Link State Routing algorithm.
10. Simulation of an error correction code (like CRC)

Practical: 30 Hours
Total :75 Periods

COURSE OUTCOMES:

At the end of this course, the students will be able to:
    CO 1: Explain the basic layers and its functions in computer networks. CO
    2: Understand the basics of how data flows from one node to another.CO 3:
    Analyze routing algorithms.
    CO 4: Describe protocols for various functions in the network. CO
    5: Analyze the working of various application layer protocols.

TEXT BOOKS

1. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Eighth Edition, Pearson Education, 2021.
2. Behrouz A. Forouzan, "Data Communications and Networking with TCP/IP Protocol Suite", Sixth Edition TMH, 2022

REFERENCES

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, "Computer and Communication Networks", Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2012.

22AD405	MACHINE LEARNING	L	T	P	C
		3	0	2	4

Course Objective:

1. To understand the basic concepts of machine learning and probability theory.

2. To appreciate supervised learning and their applications.

3. To understand unsupervised learning like clustering and EM algorithms.

4. To get practical knowledge on implementing machine learning algorithms in real time problem.

5. To learn other learning aspects such as reinforcement learning, neural networks and other technologies.

UNIT I   INTRODUCTION   8

Introduction: Basic definitions and Concepts, Machine Learning – Types of Machine Learning- Machine Learning Process- Supervised Learning – Unsupervised Learning-Reinforcement Learning, hypothesis space and inductive bias, evaluation, cross-validation-Weight Space – Testing.

UNIT II   SUPERVISED LEARNING   10

Linear and Non Linear Regression, Multivariate Regression, Logistic Regression, Subset Selection, Shrinkage Methods, Principal Component, Regression, Partial Least squares - Linear Classification, Linear Discriminant Analysis - Perceptron, Discriminant Functions – Probabilistic Generative and Discriminative Models – Laplace Approximation – Bayesian Logistic Regression – Common Classification Algorithms – k-Nearest Neighbors – Decision Trees – Random Forest model – Support Vector Machines.

UNIT III   UNSUPERVISED LEARNING   9

Mixture Models and EM – K-Means Clustering –Spectral Clustering – Hierarchical Clustering – The Curse of Dimensionality – Dimensionality Reduction – Principal Component Analysis – Latent Variable Models (LVM) – Latent Dirichlet Allocation (LDA).

UNIT IV   GRAPHICAL MODELS   9

Artificial Neural Networks-Gradient Boosting, Random Forests, Multi-class Classification, Naive Bayes, Bayesian Networks, Undirected Graphical Models, HMM, Variable Elimination, Belief Propagation- Conditional Independence – Markov Random Fields – Learning – Naive Bayes Classifiers – Markov Model – Hidden Markov Model.

UNIT V   ETHICAL, SUSTAINABILITY AND APPLICATIONS   9

Fairness and Bias - Transparency and Explainability_ Sustainability_ Bias Mitigation_ Ethical AI Education_ Transfer Learning_ Open Source and Collaboration_ Chabot‟s and Virtual Assistants_ Content Recommendation_ Disease Diagnosis_ Drug Discovery_ Predictive Analytics_ Algorithmic Trading_ Autonomous Systems_ Predictive Maintenance_ Automated Grading.

Theory: 45 Periods

LIST OF EXPERIMENTS

1. Implement the concept of decision trees with suitable data set from real world problem and classify the data set to produce new sample.
2. Detecting Spam mails using Support vector machine
3. Facial recognition application with artificial neural network
4. Sentiment analysis using random forest optimization algorithm
5. Implement k-means clustering.
6. Construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
7. Implement suitable Machine learning algorithm for online fraud detection
8. Mini-project

Practical: 30 Periods
Total: 75 Hours

Course Outcomes:

CO1: Apply supervised learning techniques to real-world datasets and practical problems.

CO2: Relate ethical concerns in unsupervised learning, including bias and privacy considerations.

CO3: Discover the importance of domain knowledge in feature engineering.

CO4: Apply graphical models to real-world datasets and solve practical problems by modeling dependencies and making predictions.

CO5: Implement Q-learning and TD learning algorithms to learn value functions and optimal policies in environments with unknown dynamics.

Text Books

1. Ethem Alpaydin, " Introduction to Machine Learning", 4th Edition, PrenticeHall of India,2020.

References Books

1. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer, 2011.

2. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.

3. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition, CRCPress, 2014.

4. Tom Mitchell, "Machine Learning", McGraw-Hill, 2017.

22IT405	WEB PROGRAMMING	L	T	P	C
		2	0	4	4

Course Objective:
- To understand the basics of WWW and Web design
- Develop website using HTML, CSS and java scripts
- To develop web application using PHP & MySQL
- To send and receive data using XML &AJAX

Unit I   INTRODUCTION TO WEB DESIGN, HTML AND CSS   10

Concept of HTTP Protocol: Request and Response, Web browser and Web servers. Concepts of effective web design, Page Layout and linking, Planning and publishing website, Designing effective navigation. Basics of HTML – Tags- Features of HTML. Introduction to CSS –CSS Layout Techniques.

Unit II   JAVASCRIPT & XML   10

Introduction to Javascript – Javascript grammar and Types – JS with DOM and Events- JS with UI/Events – Understanding forms – Form Validation - Error Handling. uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application, XSL, XSLT.

Unit III   PHP & AJAX   10

Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Cookies, AJAX Architecture- Dynamic web page Creation using AJAX, NodeJS, ReactJS.

Theory : 30 Periods

PRACTICAL EXERCISES:

1.   Create a HTML page, which has properly aligned paragraphs with image along with it.

2.   Create a HTML form with various fields and appropriate font and validations using Scripting language.

81

3. Design an entry form of the student with HTML5 and CSS and send it to store at database server like SQL, Oracle or MS Access.

4. Design a Web Page with HTML5, CSS and Scripting language (JavaScript/PHP) to display any browsers information.

5. Create a style sheet in CSS/ XSL & display the document in any browser with the help of XML for creation of DTD, which specifies set of rules.

6. Design and implement a simple servlet book query with the help of JDBC & SQL with the help of JavaScript/PHP for designing a website and accessing the details from the database.

7. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet program for doing the following. Create a Cookie and add these four user id,,s and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies.

8. Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number Write a PHP to connect to that database and extract data from the tables and display them. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration pages.

9. Apply PHP which insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he/she submits the login form using the username and password from the database.

10. Design and implement a simple shopping cart example with session tracking API.

Course Outcomes:

CO1 Ability to understand the concepts of WWW including browser and HTTP protocol

CO2 Apply HTML and CSS effectively to create interactive and dynamic websites.

CO3 Implement and develop client-side scripting using JavaScript and XML based webapplications.

CO4 Implement server-side script using PHP.

CO5 Develop application using recent environment like AJAX, NodeJS and ReactJS

.**Text Books**
1. Robin Nixon, "Learning PHP, MySQL & JavaScript with JQuery, CSS & HTML5", Vth Edition, O"REILLY 2022.
2. "HTML 5, Black Book", Dreamtech Press India Pvt. Ltd, 2017
3. P.J. Deitel & H.M. Deitel , " Internet and World Wide Web How to program" , Pearson, 2017

References
1. Ralph Moseley and M. T. Savaliya , "Developing Web Applications", Wiley-India, 2017
2. M. Srinivasan, " Web Technology: Theory and Practice", Pearson India, 2016
3. Harwani, "Developing Web Applications in PHP and AJAX", McGraw Hill 2015

Web References
1. https://www.w3schools.com/php/
2. https://freecomputerbooks.com/webProgrammingBooks.html

22TP705	PROGRAMMING ASPECTS AND TECHNICAL APTITUDE – I	L	T	P	C
		0	0	2	1

Unit I   Object and Class   10

Types of programming, Disadvantages of functional programming, Classes & Objects, Attributes, Methods, Objects, Solving MCQs based on Objects and Classes, Solving tricky questions based on encapsulation, Solving frequently asked object based questions

Unit II   Data types, Basic I / O   9

Data types, Data, Why data type, Variables, Available data types, Numeric – int, float, double, Character – char, string, Solving MCQs based on type casting, data types, Solving debugging based MCQs, Printing Getting input from user during run time, Command line arguments, Solving programming questions based on CLA, Solving MCQs questions based on CLA

Unit III   Decision Making, Loop Control   9

Need for control statement, if..else, if..else if..else, Nested if..else, Switch case, Common mistakes with control statements (like using = instead of ==), Solving frequently asked questions on decision making, Types of looping statements, Entry Controlled, For, While, Exit Controlled, do while, break and continue, Demo on looping, Common mistakes with looping statements (like using ; at the end of the loop), Solving pattern programming problems, series problems, Solving predict the output questions

Unit IV   String, Date, Array   10

String handling, date handing, Solving problems based on arrays like searching, sorting, rearranging, iteration), Multi-dimensional arrays, Solving pattern problems using 2D arrays, Real time application based on 2D arrays

Unit V   PROBLEM SOLVING AND ALGORITHMIC SKILLS   7

Types of access specifiers, Demo on access specifiers, Assignment on access modifiers - Instance Members, Solving MCQs based on modifiers

Total : 45 Periods

ARTIFICIAL INTELLIGENCE   **L T P C**
                                                                                          3 0 2 4

COURSE OBJECTIVE:
On completion of the course, the students will be able to
- Gain a fundamental understanding of artificial intelligence, its history, key concepts, and various subfields.
- Develop problem solving agents
- Learn how to apply AI techniques to real-world problems

UNIT I   INTELLIGENT AGENTS AND BLIND SEARCH: 9

Definition – History – Agents and Environments – Good behaviour and the concepts of rationality – Nature of environments – Structure of intelligent agents. State space search: Generate and Test – Simple search – Depth First Search (DFS) – Breadth First Search (BFS) – Comparison of DFS and BFS – Depth Bounded DFS.

UNIT II   INFORMED SEARCH METHODS: 9

Informed Search Methods: Heuristic Search: Heuristic functions – Best First Search – Hill Climbing – Local maxima – Solution state space – Variable neighbourhood descent – Beam Search – Taboo search. Peak to Peak methods. Brute force – Branch and Bound – Refinement search.

UNIT III   A* AND RANDOMIZED SEARCH METHODS   9

Algorithm A* - Admissibility of A* - Recursive Best First Search. Escaping local maxima: Iterated hill climbing – Simulated annealing – Genetic algorithms (GA) – Travelling Salesman Problem (TSP) – GA based methods for TSP.

UNIT IV GAME PLAYING, PLANNING AND CONSTRAINT SATISFACTION   9

Board games – Game playing algorithms: Algorithm Minimax - Algorithm AlphaBeta – B* Search – Limitations of search. The STRIPS domain – Forward state space planning – Backward state space planning – Goal stack planning – Introduction to Constraint satisfaction Problem – N-Queens.

UNIT V PREPOSITIONAL LOGIC, FIRST ORDER LOGIC AND INFERENCING   9

Formal logic – Propositional logic – Resolution in propositional logic – First Order Logic (FOL) – Incompleteness of forward chaining – Resolution refutation in FOL – Horn clauses and SLD resolution – Backward chaining.

                                                               Theory: 45 Periods

List of Experiments:
      1.   Implement basic search strategies – 8-Puzzle, 8 - Queens problem.

2. Implement various search strategies.

3. Implement A* and memory bounded A* algorithms

4. Implement Minimax algorithm for game playing (Alpha-Beta pruning)

5. Solve constraint satisfaction problems

6. Implement propositional model checking algorithms

7. Implement forward chaining, backward chaining, and resolution strategies

Practical: 30 Periods
Total: 75 Hours

Course Outcomes
On completion of the course, the students will be able to

CO1: Paraphrase Artificial Intelligence, intelligent agents, and apply blind search to solve problems.

CO2: Demonstrate the effectiveness of heuristics in informed search methods

CO3: Determine optimal solutions using A* and randomized search methods.

CO4: Apply game playing and planning in problem solving.

CO5: Make use of propositional logic and first order logic in knowledge-based reasoning

Text Books:

1. Formal logic – Khemani D., "A First Course in Artificial Intelligence", 1st Edition, 9th reprint, McGraw Hill Education (India) Private Limited, 2019
2. Propositional logic – Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Pearson Education, 2013.

Reference Books
1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education,2007
2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008
3. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006
4. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013

Web resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs56/

Course Objectives:

		L	T	P	C
22IT402	**SOFTWARE ENGINEERING**	**3**	**0**	**0**	**3**

• To understand the phases in a software project and basics of UML.
• To understand fundamental concepts of requirements engineering and Analysis, Modeling using UML.

• To understand the various software design methodologies
• To learn various testing and maintenance measures
• To learn fundamental concepts of project management concepts

Unit-I   INTRODUCTION TO SOFTWARE ENGINEERING AND UML   9

The Nature of Software -Software Engineering Failures- Software Engineering - Software Process Structure - Software Lifecycle Models - Agile Development - Scrum - Prototyping- Modeling with UML -Modeling Concepts

Unit-II   REQUIREMENTS ANALYSIS   9

Project Organization Concepts - Project Communication Concepts - UML Activity Diagram-Requirements Elicitation - Usability - Requirement Analysis - UML Use Case Diagram - UML Analysis Object Class Diagram- Kanban principles and practices - Implementing kanban in software projects.

Unit-III   SYSTEM DESIGN   9

System Design Concepts-System Design Activities: From Objects to Subsystems- Patterns - Architectural Patterns - UML Component and Deployment Diagram - Object Design –Software design-High level design-Detailed Design (Class, Sequence, components, state)-System Design Patterns - UML Class and Communication Diagram

Unit-IV   CODING & TESTING   9

Mapping Models to Code- Overview of Mapping - Mapping Concepts- Mapping Activities - Managing Implementation-Testing- Overview of Testing- Testing Concepts-Faults, Erroneous States, Failures-Test Cases- Test Stubs and Drivers- Corrections-Testing Activities- Component Inspection – Usability Testing-Unit Testing-Integration Testing-System Testing-Managing Testing-Planning Testing-Documenting Testing-Assigning Responsibilities-Regression Testing- Automating testing

Unit-V   PROJECT MANAGEMENT   9

Rationale Management- Overview of Rationale - Rationale Concepts- Rationale Activities: from Issues To Decisions-Managing Rationale- Configuration Management Concepts- Configuration Management Activities - Managing Configuration Management.

Total: 45 Hours

Course Outcomes:

On Completion of the course, the students should be able to:

  CO1: Apply the key activities in managing a software project.
  CO2: Demonstrate the concepts of requirements engineering and Analysis Modeling.
  CO3: Apply systematic procedure for software design and deployment.
  CO4: Compare and contrast the various testing and maintenance.
  CO5: Manage project schedule, estimate project cost and effort required.

TEXT BOOK:

1.   Bernd Bruegge & Allen H. Dutoit, "Object-Oriented Software Engineering", Third Edition, 2014.

REFERENCES:

1.   R.S. Pressman, "Software Engineering, A Practitioner's Approach", Eighth Edition, McGraw

Hill International Edition, 2015

2. Ivar Jacobson, "Object-Oriented Software Engineering", Pearson Education, Revised Edition 2020
3. Stephen R.Schach, "Object-Oriented Classical Software Engineering", Mcgraw Hill, Eighth Edition 2010
4. Yogesh Singh, "Object-Oriented Software Engineering", 2012.
5. M. Blaha and J. Rumbaugh, "Object Oriented Modeling and Design with UML", Second Edition, Prentice-Hall   India, 2017.

22EC501	INTRODUCTION TO IOT AND EMBEDDED PROGRAMMING	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:
- To introduce the evolution of the Internet of Things (IoT).
- To build a small low-cost embedded and IoT system using Arduino/Raspberry Pi/ open platform.
- To learn the internal architecture and programming of an embedded processor.
- To introduce interfacing I/O devices to the processor.
- To apply the concept of Internet of Things in real world scenario.

UNIT I IOT AND ARDUINO PROGRAMMING   9

Introduction to the Concept of IoT Devices – IoT Devices Versus Computers – IoT Configurations – Basic Components – Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins – Input/Output From Pins
Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino.

UNIT II IOT COMMUNICATION AND OPEN PLATFORMS   9

IoT Communication Models and APIs – IoT Communication Protocols – Bluetooth – WiFi – ZigBee – GPS – GSM modules – Open Platform (like Raspberry Pi) – Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud.

UNIT III 8-BIT EMBEDDED PROCESSOR   9

8-Bit Microcontroller – Architecture – Instruction Set and Programming – Programming Parallel Ports – Timers and Serial Port – Interrupt Handling.

UNIT IV EMBEDDED C PROGRAMMING   9

Memory And I/O Devices Interfacing – Programming Embedded Systems in C – Need For RTOS – Multiple Tasks and Processes – Context Switching – Priority Based Scheduling Policies.

UNIT V APPLICATIONS DEVELOPMENT   **9**

Complete Design of Embedded Systems – Development of IoT Applications – Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare.

Theory: 45 PERIODS

List of Experiments:
1. Introduction to Arduino platform and programming
2. Explore different communication methods with IoT devices (Zigbee, GSM, Bluetooth)
3. Introduction to Raspberry PI platform and python programming
4. Interfacing sensors with Raspberry PI
5. Communicate between Arduino and Raspberry PI using any wireless medium
6. Setup a cloud platform to log the data
7. Log Data using Raspberry PI and upload to the cloud platform
8. Write 8051 Assembly Language experiments using simulator.
9. Test data transfer between registers and memory.
10. Perform ALU operations.
11. Write Basic and arithmetic Programs Using Embedded C
12. Design an IOT based system.

Practical: 30 Hours
TOTAL :75 Hours

COURSE OUTCOMES:

CO1: Compare the communication models in IOT

CO2: Design IoT applications using Arduino/Raspberry Pi /open platform.

CO3: Explain the architecture of embedded processors.

CO4: Write embedded C programs.

CO5: Design simple embedded applications.

TEXTBOOKS

1. Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second Edition, 2014.

2. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017.

REFERENCES

1. Michael J. Pont, "Embedded C", Pearson Education, 2007.

2. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.

3. Andrew N Sloss, D. Symes, C. Wright, "Arm System Developer's Guide", Morgan Kauffman/ Elsevier, 2006.

4. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015

		L T P C
22TP706	**PROGRAMMING ASPECTS AND TECHNICAL APTITUDE – II**	**0 0 2 1**

Unit I   Inheritance, Aggregation & Associations   10

Need, Is A – Inheritance, Types of inheritance supported, Diagrammatic representation, Demo on inheritance, Has A – Aggregation, Diagrammatic representation, Demo on aggregation, Uses A – Association, Diagrammatic representation, Demo on association, Assignment on relationships, Solving MCQs based on relationships between classes

Unit II   Interface & Abstract classes (Java specific)   5

Abstract Classes, Need, Abstract Classes, Abstract Methods, Interfaces, Assignment on abstract classes and interface

Unit III   Packages (Java specific)   3

Need for packages, Access specifiers & packages, Import classes from other packages

Unit IV   Collections (Java specific) List, Tuple & Dict in Python   12

Array List, Linked List, List Interface, Hash Set, Map Interface, Hash Map, Set List, Tuple &
Dict, Programming questions based on collections, Real world problems based on data structure

Unit V   Solving algorithmic problems   15

Case study: Using correct data structures, Modifying well known existing algorithms,
Discussion on computing the complexity of the algorithm, Solving dynamic programming questions