COURSE STRUCTURE
AND
DETAILED SYLLABUS

R22

COMPUTER SCIENCE AND ENGINEERING

for

BTech 4-Year Degree Course

(Applicable for the students admitted into E1 from the Academic Year 2022-23)

(I – IV Years Syllabus)

RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES

Basar, Nirmal, Telangana – 504107

Semester wise Course Structure

FIRST YEAR (E1) – SEMESTER – II

Sl. No	Course Code	Course Title	Course Category	L	T	P	Total Contact Hours	Credits
1	HS1201	English	HSMC	2	0	0	2	2
2	HS1801	English Language Lab	HSMC	0	0	2	2	1
3	MA1201	Differential Equations and Vector Calculus	BSC	3	1	0	4	4
4	PH1201	Engineering Physics	BSC	3	0	0	3	3
5	PH1801	Engineering Physics Lab	BSC	0	0	3	3	1.5
6	EE1202	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
7	EE1802	Basic Electrical and Electronics Engineering Lab	ESC	0	0	2	2	1
8	CS1202	Data Structures and Algorithms	PCC	3	0	0	3	3
9	CS1802	Data Structures and Algorithms Lab	PCC	0	0	3	3	1.5
10	BS1201	Environmental Science	MC	3	0	0	3	0
Total				**17**	**1**	**10**	**28**	**20**

SECOND YEAR (E2) – SEMESTER – II

Sl. No	Course Code	Course Title	Course Category	L	T	P	Total Contact Hours	Credits
1	MA2202	Probability and Statistics	BSC	3	1	0	4	4
2	CE2804	Engineering Graphics	ESC	1	0	4	5	3
3	CS2203	Design and Analysis of Algorithms	PCC	3	0	0	3	3
4	CS2803	Design and Analysis of Algorithms Lab	PCC	0	0	3	3	1.5
5	CS2201	Web Technologies	PCC	3	0	0	3	3
6	CS2801	Web Technologies Lab	PCC	0	0	3	3	1.5
8	CS2202	Operating System	PCC	3	0	0	3	3
9	CS2802	IT Workshop	PCC	0	0	3	3	1.5
Total				**13**	**1**	**13**	**27**	**20.5**

THIRD YEAR (E3) – SEMESTER – II

Sl. No	Course Code	Course Title	Course Category	L	T	P	Total Contact Hours	Credits
1	HS3203	Soft Skills	HSMC	0	0	2	2	1
2	EC3203	Introduction to Internet of Things	ESC	3	0	0	3	3
4	CS3201	DevOps	PCC	3	0	0	3	3
5	CS3801	DevOps Lab	PCC	0	0	3	3	1.5
6	CS3202	Machine Learning	PCC	3	0	0	3	3
7	CS3802	Machine Learning Lab	PCC	0	0	3	3	1.5
3	CS3203	Automata Theory and Compiler Design	PCC	3	1	0	4	4
8	CS3225	Human Computer Interaction	PEC-II	3	0	0	3	3
9	CS3232	Adhoc Sensor Networks	PEC-III	3	0	0	3	3
10	CS3902	Mini Project-II	SIP	0	0	4	0	2
Total				**18**	**1**	**12**	**27**	**25**

FOURTH YEAR (E4) – SEMESTER – II

Sl. No	Course Code	Course Title	Course Category	L	T	P	Total Contact Hours	Credits
1	CS4404	Cyber Law and Ethics	OEC	3	0	0	3	3
2	CE4402	Dsaster Management	OEC	3	0	0	3	3
3	BM4416	Enterpreneurship and New Ventures	OEC	3	0	0	3	3
4	BS4401	Sustainable Technology	OEC	3	0	0	3	3
5	BM4414	Intellectual Property Rights	OEC	3	0	0	3	3
6	CS4902	Project-III	SIP	0	0	12	0	6
Total				**6**	**0**	**12**	**6**	**13**

Engineering 1 - Semester 2

Course Code	Course Title					Course Type
HS1201	English					HSMC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	2	0	0	40	60	2

Course Objectives:

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using The theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes

1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Detailed Contents

UNIT-I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.
Grammar:Identifying Common Errors in Writing with Reference to Articles andPrepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading.
Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences
Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT-II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint,
Letter of Requisition, Job Application with Resume.

UNIT-III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning.

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

UNIT-IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading.

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT-V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Text Books

- Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

Course Code	Course Title					Course Type
HS1801	English Language Lab					HSMC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	2	40	60	1

Course Objectives

- To facilitate computer-assisted multimedia instruction enabling individualized and independent language learning.
- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm.
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
- To improve the fluency of students in spoken English and neutralize their mother tongue influence.
- To train students to use language appropriately for public speaking and interview.
- To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
    - Listening for general content.
    - Listening to fill up information.
    - Intensive listening.
    - Listening for specific information.

Speaking Skills :

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

Course Outcomes

1. Better understanding of nuances of English language through audio- visual experience and group activities.
2. Neutralization of accent for intelligibility.
3. Speaking skills with clarity and confidence which in turn enhances their employability.

Detailed Contents

UNIT-I

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening - Communication at WorkPlace- Spoken vs. Written language.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants -Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

UNIT-II

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context- Features of Good Conversation – Non-verbal Communication.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms inContext- Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

UNIT-III

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI)- How to make Formal Presentations.

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation- Formal Presentations.

UNIT-IV

Understand: Listening for General Details-Public Speaking – Exposure to Structured Talks.

Practice: Listening Comprehension Tests- Making a Short Speech – Extempore

UNIT-V

Understand: Listening for Specific Details- Interview Skills.

Practice: Listening Comprehension Tests- Mock Interviews.

References

1. Clarity English Success - Software.
2. Connected Speech- Software.
3. Issues in English 2- Software.
4. http://www.clarityenglish.com/program/practicalwriting/
5. http://www.clarityenglish.com/program/roadtoielts/
6. http://www.clarityenglish.com/program/clearpronunciation1/
7. http://www.clarityenglish.com/program/resultsmanager/

Course Code	Course Title					Course Type
MA1201	Differential Equations and Vector Calculus					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	4

Course Objectives

- Methods of solving the differential equations of first and higher order.
- To study the methods of solving improper integrals and the concepts of multiple integrals.
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.
- To study numerical methods to analyze experimental data.

On Completion of this course the students will be able to:

1. Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.
2. Compare and contrast the ideas of continuity and differentiability.
3. To inculcate to solve algebraic equations and inequalities involving the sequence root and modulus function
4. Calculate directional derivatives and gradients.
5. Apply gradient to solve problems involving normal vectors to level surfaces.
6. Explain the concept of a vector integration in a plane and in space.

Detailed Contents

UNIT-I

Ordinary Differential Equations of first order: Exact first order differential equation, finding integrating factors, linear differential equations, Bernoulli's ,Riccati , Clairaut's differential equations, finding orthogonal trajectory of family of curves, Newton's Law of Cooling, Law of Natural growth or decay.

UNIT-II

Ordinary Differential Equations of higher order: Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type □□□,sin(□□),cos (□□), polynomials in□,□□□□(□),□□(□); method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III

Integral Calculus: Evaluation of the double integrals (Cartesian and Polar), change of order of integration (only Cartesian form), Evaluation of Triple integrals. Change of variables (Cartesian to polar) in case of double integrals (Cartesian to spherical and cylindrical) in case of Triple Integrals-Jacobians of transformations. Differentiation of integrals with variable limits - Leibnitz rule.

Applications: Finding Areas (using double integrals) and volumes (using double and Triple Integrals), Centre of mass, Centre of gravity for constant and variable densities by double and triple integrals (applications involving cubes, Sphere and rectangular parallelepiped).

UNIT-IV

Vector Differentiation: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V

Vector Integration: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Numerical Methods: Introduction and motivation about numerical methods, True value, approximate value, error, error percentage, algebraic equations, transcendental equations, Newton-Raphson method, Bisection method.

Text Books

- R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics," 3rd ed., New Delhi, India: Narosa Publishing House, 2007.

References

1. E. Kreyszig, "Advanced Engineering Mathematics," 8th ed., New Delhi, India: Wiley-India, 2017.
2. M. D. Raisinghania, "Ordinary and Partial Differential Equations," 17th ed., New Delhi, India: S. Chand & Company Ltd., 2014.

Course Code	Course Title					Course Type
PH1201	Engineering Physics					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To acquire skills allowing the student to identify and apply formulas of physics using course literature.
- To be able to identify and illustrate physical concepts and terminology used and to be able to explain them in appropriate detail.
- To be able to make approximate judgments of physical aspects and other phenomena when necessary.
- To acquire skills allowing the student to organize and plan simpler laboratory course experiments and to prepare an associated oral and written report.

Course Outcomes

1. The basic laws of physics, their corollaries, and comprehension of how they can be applied to explain specific natural phenomena within the five key topic-areas* as described in the mission statement of the physics undergraduate program.
2. Use of critical thinking, hypothesis building, and application of the scientific method to physics concepts, theoretical models and calculations, and laboratory experimentation.
3. Problem solving skills and relevant mathematical methods to approach, conceptualize, and achieve analytical or numerical solutions to physics problems within important sub-categories of the five topic-areas*.
4. Laboratory skills and exposure to a variety of important experiments at appropriate levels that illustrate phenomena discussed in the lecture classes. Instrumentation and experimental techniques; methods for quantitative analysis of data and measurement uncertainty.
5. General knowledge of the development of physics and the nature of scientific inquiry, particularly the progression from classical physics to the modern physics ideas of quantum mechanics, statistical mechanics, and relativity.
6. Contemporary areas of physics inquiry as introduced in upper-level physics and interdisciplinary elective courses, as well as in faculty-mentored undergraduate research available to all majors who seek this experience.
7. Written and oral communication skills for dissemination of scientific results in report, article, or oral presentation formats; standard citation methods; ethics in science and scholarship and its importance to scientific inquiry and professionalism.
   (*key-topic areas as given in the Mission Statement of the physics undergraduate program are:
   i) Electrodynamics; ii) Quantum Mechanics; iii) Electron Structure of Solids;
   iv) Semiconductor Physics; v) experimental methods.

Detailed Contents

UNIT-I

Electrodynamics Gradient, Divergence, Curl and its applications, Line, surface and volume integrals, Stokes and Gauss theorem: Applications, Curvilinear Coordinates: Polar, Cylindrical and spherical coordinates, Problems. Electrodynamics before Maxwell, Fixing of Ampere's Law, Maxwell Equations in Matter, Boundary Conditions, Continuity Equation, Poynting Theorem, Wave equation for E and B, Monochromatic Plane Waves, Energy and Momentum in EM Waves.Propagation in Linear Media, Reflection and Transmission at Normal Incidence.

UNIT-II

Quantum Mechanics Introduction to Quantum Mechanics, De-Broglie's waves auncertainty principle, Wave Function and its Significance, Time dependent and time independent Schrodinger wave equations, Particle in a box - Problems.

UNIT-III

Electron Structure of Solids Introduction to Crystallography, Bravais Lattices and crystal systems, Atomic Packing, Atomic Radii, Crystal Structures (SC, BCC and FCC), Miller Indices, Classical Free electron Theory, Kronig Penny model (E vs K), Band theory of solids.

UNIT-IV

Semiconductor Physics Intrinsic and extrinsic semiconductors, Fermi level and carrier- concentration, Effect of temperature on Fermi level. Mobility of charge carriers and effect of temperature on mobility.

UNIT-V

Optics Interference- Introduction and examples, Young's; double slit experiment, Diffraction – Types, Single Slit, Double Slit, Diffraction Grating.

Text Books

- H.K. Malik and Singh, "Engineering Physics," New Delhi, India: Tata McGraw-Hill Education, 2018.

References

1. D.J. Griffiths, "Introduction to Electrodynamics," 4th ed., Upper Saddle River, NJ: Prentice Hall, 2012.
2. Aruldha, "Quantum Mechanics," New Delhi, India: McGraw-Hill Education, 2018.
3. C. Kittel, "Introduction to Solid State Physics," 8th ed., Hoboken, NJ: Wiley, 2005.

Course Code	Course Title					Course Type
PH1801	Engineering Physics Lab					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

- To gain practical knowledge by applying experimental methods to correlate with the theory.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic understanding of various experimental principles involved.

Course Outcomes

1. Prepare and perform individually a wide spectrum of experiments.
2. Present experimental data in various appropriate forms like tabulation and plots.
3. Analyze, interpret and summarize the experimental results.
4. Communicate clearly the understanding of various experimental principles, instruments/setup, and procedure.

List of experiments:

1. Photoelectric effect.
2. Hall effect.
3. Ultrasonic Interferometer.
4. Melde's Experiment.
5. Four probe Method.
6. Frank hertz Experiment.
7. Seebeck and Peltier effect.
8. Solar cell.
9. Couple pendulum.
10. Dispersive power of prism.
11. Diffraction Grating.
12. Flywheel.

Course Code	Course Title					Course Type
EE1202	Basic Electrical and Electronics Engineering					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- Electrical DC and AC circuits, basic laws of electricity and methods to solve the electrical networks
- Construction operational features of energy conversion devices i.e. transformers , DC motors and induction motors.
- Basics of electronics, semiconductor devices and their characteristics and operational features.

Course Outcomes

1. Understand the basic concept of electrical circuits under DC and AC excitation and solve basic electrical circuit problems.
2. Understand basic concept and performance of transformers and motors used as various industrial drives.

Detailed Contents

UNIT- I

DC CIRCUIT ANALYSIS :**Electrical circuit elements:** R-L-C Parameters, V–I relationship for Passive elements, Diode, Voltage and Current Independent and Dependent Sources .

Circuit analysis:Kirchoff's Laws, Network reduction techniques – series, parallel, series parallel, star–to-delta, delta-to-star transformation, Source Transformation, Mesh Analysis and Nodal Analysis

Network Theorems - Thevenin's, Norton's, Maximum Power Transfer, Superposition .

Step response of RL,RC and RLC circuits

UNIT- II

AC CIRCUIT ANALYSIS :Single Phase AC Circuits - R.M.S. and Average values, Form Factor, steady state analysis of series, Parallel and Series parallel Combinations of R, L and C with Sinusoidal excitation, concept of reactance, Impedance, Susceptance and Admittance – phase and phase difference, Concept of Power Factor, j-notation, complex and Polar forms of representation.

Resonance – Series resonance and Parallel resonance circuits.

UNIT- III

THREE PHASE AC CIRCUITS

Three phase ac circuits -Three phase EMF generation, delta and Y connections, line and phase quantities, solution of three phase circuits, balanced supply voltage and balanced load, phasor diagram, measurement of power in three phase circuits.

UNIT- IV

Basic Electronics

Introduction to electronics and electronic systems, Diode and Rectifier circuits (Half and Full wave), BJT, Transistor biasing. Small signal transistor amplifiers (CE), Operational amplifiers and their basic application, Introduction to digital circuits.

UNIT- V

Electrical Machines

Transformers : Construction, EMF equation, ratings, phasor diagram on no load and full load, equivalent circuit, regulation and efficiency calculations, open and short circuit test , applications.

DC machines: Construction, EMF and Torque equations, Characteristics of DC generators and motors, applications.

Induction motors: The revolving magnetic field, principle of orientation, ratings, equivalent circuit, Torque-speed characteristics, application.

Text Books

- Hughes, Edward, and John H. Brown. Electrical Technology. Prentice Hall, 7th edition.
- Smith, S. Parker. Problems In Electrical Engineering. 9th edition.
- Boylestad, R.L., and Louis Nashelsky. Electronic Devices and Circuits. PEI/PHI, 9th Ed, 2006.
- Millman, J., and C.C. Halkias. Millman's Electronic Devices and Circuits. Satyabratajit, TMH, 2/e, 1998.
- Hayt, William, and Jack E. Kemmerly. Engineering Circuit Analysis. McGraw Hill Company, 6th edition.
- Nagrath, I.J., and D.P. Kothari. Electric Machines. Tata McGraw Hill, 7th Edition, 2005.

References

1. Kishore, K. L. (2005). Electronic Devices and Circuits. B.S. Publications, 2nd Edition.
2. Maini, A. K., & Agarwal, V. (2009). Electronic Devices and Circuits. Wiley India Pvt. Ltd., 1st Edition.
3. Jagan, N. C., & Lakshminarayana, C. (n.d.). Network Theory. B.S. Publications.
4. Sudhakar, C., & Palli, S. M. (n.d.). Network Theory. Tata McGraw-Hill.
5. Bhimbra, P. S. (n.d.). Electrical Machines. Khanna Publishers.

Course Code	Course Title					Course Type
EE1802	Basic Electrical and Electronics Engineering Lab					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	2	40	60	1

Course Objectives

- To expose the students to the concepts of electrical and electronics circuits and their applications.
- To expose the students to the operation of dc machines and transformers and give them experimental skills.

Course Outcomes

1. Understand principles of measuring instruments of voltage, current and power.
2. Analyze the characteristics of semiconductor devices and understand their applications.
3. Analyze the characteristics and evaluate performance of DC machines and transformers.

LIST OF EXPERIMENTS

1. Introduction to Lab:
    a. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
    b. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
3. Transformers: Observation of the no-load current waveform on an oscilloscope (non sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
4. Open circuit & short circuit test on single phase transformer.
5. Verification of KCL&KVL.
6. Characteristics of the lamps (Tungsten, Fluorescent and Compact Fluorescent Lamps).
7. Verification of Network Theorems.
8. V-I characteristics of Diodes and BJT.
9. Half-wave and full-wave rectifiers, rectification with capacitive filters, zener diode.
10. Studies on logic gates.

Course Code	Course Title					Course Type
CS1202	Data Structures and Algorithms					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	4

Course Objectives

- To develop proficiency in the specification, representation, and implementation of abstract data types and data structures.
- To get a good understanding of applications of data structures.
- To solve advanced computer science problems by making appropriate choice for intended applications.

Course Outcomes

1. Students will be able to represent and manipulate linear and non-linear data structures using the C programming language.
2. Students will be able to apply different searching and sorting algorithms to solve problems.
3. Students will understand the concepts of binary trees and search trees, and be able to perform operations on them.
4. Students will be able to implement stack and queue ADTs using both array and linked representations.
5. Students will understand the basics of graph theory, including graph traversals such as BFS and DFS.

Detailed Contents

UNIT-I

Basic Concepts - Algorithm specification, Introduction, Recursive algorithms. Introduction to Linear and non-linear Data structures. Representation of single and two dimensional arrays, Singly Linked List Operations- Insertion, Deletion, Concatenating Single Linked Lists, Circular Linked List, Doubly Linked list.

UNIT-II

Stack ADT- definitions, Operations, array and linked representation in C, application- infix to postfix conversion, postfix expression evaluation, recursion implementation.

Queue ADT- definitions and operations, circular queues, double ended queue array and linked representation.

UNIT-III

Trees- Terminology, Representation of Trees, Binary tree ADT, Properties of Binary trees, array and linked representation of Binary trees, Max Heap, Min Heap.

Graph- Introduction, Definition and terminology, Graph traversals- BFS and DFS.

UNIT-IV

Searching and sorting – Linear and Binary Search, Sorting – Insertion, Bubble, Selection, Radix, Quick , Merge, Heap sorts. Comparisons of Sorting Algorithms.

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

UNIT-V

Search Trees- Binary search Trees-operations, AVL Trees-height of AVL, operations. Tree operations on B Trees and B+ trees. Red Black trees-Definition and Representation and application .

Text Books

- N. Karumanchi, "Data Structures and Algorithms Made Easy," CareerMonk Publications, 2011.

References

1. Horowitz, E., Sahni, S., & Freed, S. A. (2007). Fundamentals of Data Structures in C, 2nd Edition. Universities Press.
2. Tanenbaum, A. S., Langsam, Y., & Augenstein, M. J. (2011). Data Structures Using C. Pearson Education India.
3. M. A. Weiss, "Data Structures and Algorithm Analysis in C++," 3rd ed., Pearson Education, 2006.
4. M. T. Goodrich, R. Tamassia, D. Mount, "Data Structures and Algorithms in C++," 2nd ed., Wiley India Pvt. Ltd, 2004.

Course Code	Course Title					Course Type
CS1802	Data Structures and Algorithms Lab					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

- To provide experience on design, testing, and analysis of Algorithms and DataStructures.
- To acquaint the students with the Data Structures used in the Computer Science field.

Course Outcomes

1. Students will understand and be able to represent different data structures using arrays and linked lists.
2. Students will be able to apply different operations on data structures such as polynomial operations, sparse matrices, stacks, queues, double ended queues, priority queues, binary trees, graphs, and string representation.
3. Students will be able to apply various sorting and searching algorithms to solve problems.
4. Students will be able to implement different pattern matching algorithms to solve problems related to string representation.
5. Students will be able to use B-tree and B+ tree data structures for database management and indexing.

Experiments:

1. Representation of Polynomials using Arrays and Linked List and the different operations that can be performed on Polynomials
2. Representation of Sparse Matrix using Arrays and Linked List and the different operations that can be performed on Sparse Matrices
3. Representation of Stacks using Arrays and Linked List and the different operations that can be performed on Stacks
4. Representation of Queues using Arrays and Linked List and the different operations that can be performed on Queues
5. Representation of Double Ended Queue using Arrays and Linked List and the different operations that can be performed on Double Ended Queue
6. Representation of Priority Queues using Arrays and Linked List and the different operations that can be performed on Priority Queues
7. Representation of Binary Trees using Arrays and Linked List and the different operations that can be performed on Binary Trees
8. Representation of Graphs using Arrays and Linked List and the different operations that can be performed on Graphs
9. Infix, Postfix and Prefix conversions.
10. Different Sorting and Searching methods.

11. String representation using Arrays and Linked List and different pattern matching algorithms
12. Implementation and operations on B-Tree and B+ Tree For the detailed list of programs refer to the lab manual.

Course Code	Course Title					Course Type
BS 1201	Environmental Science					MC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	0

Course Objectives

- To introduce students to the multidisciplinary nature of environmental studies and its scope and importance.
- To create awareness among students about the need for conservation and sustainable use of natural resources.
- To educate students about the structure, function, and value of ecosystems and biodiversity, as well as the threats they face and methods for their conservation.
- To familiarize students with the causes, effects, and control measures of different types of pollution and the legal framework for environmental protection.
- To sensitize students to the social issues related to the environment and their role in promoting sustainable development.

Course Outcomes

1. Students will be able to understand the complex interrelationships between different components of the environment and their impact on human well-being.
2. Students will develop an appreciation for the importance of conservation and sustainable use of natural resources and become aware of their individual and collective responsibilities towards the environment.
3. Students will be able to understand the functioning of different ecosystems and their role in maintaining the ecological balance.
4. Students will be able to identify different types of pollution and their causes, effects, and control measures, and develop an understanding of the legal framework for environmental protection.
5. Students will become aware of the social issues related to the environment and the role of education, technology, and individual actions in promoting sustainable development.

Detailed Contents

UNIT-I

Multidisciplinary Nature Of Environmental Studies:

Definition, scope and importance, need for public awareness.

UNIT-II

Natural Resources:

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over

water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT-III

Ecosystems & Biodiversity: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystems:-
a. Forest ecosystem, b. Grassland ecosystem, c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
b. Biodiversity- Definition : genetic, species and ecosystem diversity. Biogeographical classification of India Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
c. Biodiversity at global, National and local levels. India as a mega-diversity nation Hot-sports of biodiversity.
d. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-IV

Environmental Pollution: Definition, Cause, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards
Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution
Disaster management: floods, earthquake, cyclone and landslides.
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
Environment Protection Act., Air (Prevention and Control of Pollution) Act. Water Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

UNIT-V

Social Issues & The Environment: Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.
Field work: Visit to a local area to document environmental assets river/forest/grassland/hill/mountain Visit to a local polluted site Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

References

1. Agarwal, K.C. (2001). Environmental Biology. Nidi Publ. Ltd. Bikaner.

- Prof. Erach Bharucha, Director Bharati Vidyapeeth, Institute of Environment Education & Research, Pune
- Prof. C. Manoharachary Department of Botany Osmania University Hyderabad
- Prof. S. Thayumanavan Director Centre for Environmental Studies Anna University, Chennai
- Prof. D.C. Goswami Head, Dept. Of Environment Science Gauhati University Guwahati-781 014
- Shri R. Mehta Director EE Division Ministry of Environment & Forest Prayavaran Bhawan, CGO Complex Lodhi Road, New Delhi-110 003 UGC OFFICIALS
- Dr. N. K. Jain Joint Secretary UGC, New Delhi.

Engineering 2 - Semester 2

Course Code	Course Title					Course Type
MA2202	Probability and Statistics					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	4

Course Objectives

- To understand the concept of random variables and expectation.
- To learn various distributions and their applications.
- To study the properties of convergence of random variables.
- To know the concepts of statistics applicable in estimation and testing.

Course Outcomes

1. Use basic counting techniques (multiplication rule, combinations, permutations) to compute probability and odds.
2. Compute conditional probabilities directly and using Bayes' theorem, and check for independence of events.
3. Set up and work with discrete random variables. In particular, understand the Bernoulli, binomial, geometric and Poisson ,Negative Binomial, Hypergeometric distributions
4. Work with continuous random variables. In particular, know the properties of uniform, normal and exponential distributions.
5. Understand the law of large numbers and the central limit theorem.
6. Understand the difference between probability and likelihood functions, and find the maximum likelihood estimate for a model parameter.

Detailed Contents

UNIT-I

Basic concepts of Probability: Review of Random experiment, Sample space, Mutually exclusive events.Properties based on axiomatic definition of probability. Conditional probability. Independent events.

Random Variables: Definition of random variables. Properties of discrete and continuous random variable. Definition and properties of probability mass function and probability density function. Definition of cumulative distribution function and its properties for discrete and continuous distributions.
Multivariate Distributions: Definition and properties of multivariate distribution (continuous and discrete). Joint probability distributions. Marginal probability distributions. Conditional probability distributions.

UNIT-II

Mathematical Expectation: Concept of mathematical expectation of functions of random variables and their significance.

Discrete Distributions: Properties of various discrete distributions: Binomial, Poisson, Negative Binomial, Geometric, Hypergeometric and Discrete uniform distributions.
Continuous Distributions: Properties of various continuous distributions:Uniform, Exponential, Normal, Gamma distributions.

UNIT-III
Functions of Random Variables: Evaluating probability distribution of functions of random variables using CDF technique. Determination of joint probability distribution of functions of random variables using transformations. Using transformations to evaluate the distribution of functions of random variables.
Moments and Moment Generating Functions: Moments about origin, Central moments. Moment generating functions of random variables and its properties.

UNIT-IV
Covariance and Correlation: Definition and properties of covariance and correlation. Definition of bivariate normal distributions. Properties of its marginal distributions.
Inequalities and Limit Theorems: Chebyshev's inequality, Cauchy Schwarz inequality. Convergence in probability. Central limit theorem.
Ordered Statistics: Probability distributions of ordered statistics and their properties.

UNIT-V
Measures of Central Tendency: Mean median and mode for grouped and ungrouped data. Quartiles, variance and percentiles for given data.
Sampling and Estimation of Parameters: Concepts of sampling and estimation of mean and variance of a distribution form the sample.
Linear Regression: Linear regression for relationship between two variables.
Hypothesis Testing: Formulation of hypothesis and alternate hypothesis. One-sided and two-sided tests. Comparison of means.

Text Books

- Gupta, S.C., Kapoor V.K., Fundamentals of Mathematical Statistics (11th Edition), Sultan Chand & Sons, 2002.
- Ross, S.M., Introduction to Probability and Statistics for Engineers and Scientists (4th Edition), Academic Press, 2011.
- Gupta, A., Groundwork of Mathematical Probability and Statistics (5th Edition), Academic Publishers, 2002.

References

1. Miller, I., Miller, M., John E. Freund's Mathematical Statistics with Applications (7th Edition), Pearson Education, Inc., 2009.
2. Feller, W., An Introduction to Probability Theory and its Applications, Volume 1 (3rd Edition), John Wiley & Sons, Inc., 1967.
3. Feller, W., An Introduction to Probability Theory and its Applications, Volume 2 (2nd Edition), John Wiley & Sons, Inc., 1971.

Course Code	Course Title					Course Type
CE2804	Engineering Graphics					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	1	0	4	40	60	3

Course Objectives

- To introduce the students to the "Universal Language of Engineers" for effective communication through drawing.
- To understand the basic concepts of drawing through modern techniques.
- To impart knowledge about standard principles of projection of objects.
- To provide the visual aspects of Engineering drawing using Auto-CAD.

Course Outcomes

- At the end of the course, the student will be able to
- Use Engineering principles and techniques to understand and interpret engineering drawings.
- Understand the concepts of Auto-CAD.
- Draw orthographic projections of lines, planes and solids using Auto-CAD.
- Use the techniques, skills and modern engineering tools necessary for engineering practices.

Detailed Contents

UNIT-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, types of lines and Dimensioning.Over view of Auto-CAD: Theory of CAD software (The Menu System, ToolBars, drawing area,Dialogue boxes, Shortcut Menu, the command lines, Select and erase objects, Introduction to layers etc.) Drawing simple figures- lines, planes, solids.

UNIT-II

Geometrical constructions: Construction of regular polygons.Conic sections: Construction of Ellipse, Parabola, Hyperbola (General method only), Cycloid, Epicycloid,Hypocycloid and Involutes.
Scales: Construction of Plain, Diagonal and Vernier scales.

UNIT-III

Orthographic projections: Principles of Orthographic Projections
Projections of Points: Projections of Points placed in different quadrants
Projection of lines: lines parallel and inclined to both the planes (Determination of true lengths and true inclinations and traces) Projection of planes: Planes inclined to both the reference planes.

UNIT-IV

Projection of Solids: Projection of solids whose axis is parallel to one of the reference planes and inclined to the other plane, axis inclined to both the planes Electronics and Communication Engineering Page 42 Projection of sectioned solids: Sectioning of simple solids like prism, pyramid, cylinder and cone in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining the true shape of the section.

UNIT-V

Development of surfaces:Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views of planes and simple solids

Perspective projections: Basic concepts of perspective views.

Text Books

- Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
- Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

References

1. Shah, M.B.& Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age publications
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers(Corresponding set of) CAD Software Theory and User Manuals

Course Code	Course Title					Course Type
CS2203	Design and Analysis of Algorithms					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- Introduces the notations for analysis of the performance of algorithms.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
- Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NPcomplete.

Course Outcomes

1. Students will understand the basic concepts of algorithm design and analysis.
2. Students will be able to analyze and evaluate algorithm performance using asymptotic notations.
3. Students will learn to apply various algorithmic techniques such as divide and conquer, dynamic programming, and greedy method.
4. Students will gain proficiency in solving problems using backtracking and branch and bound methods.
5. Students will gain an understanding of NP-hard and NP-complete problems and their implications in the real world.

Detailed Contents

UNIT-I
Introduction:

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

UNIT-II
Brute Force – String Matching , Closest-Pair and Convex-Hull Problems.
Exhaustive Search – Traveling Salesman Problem, Knapsack Problem , Assignment problem.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication,convex hull,closest pair, large integer multiplication.

UNIT-III

Dynamic programming – Principle of optimality,Chain Matrix Multiplication, Computing a Binomial Coefficient , Floyd's algorithm , Multistage graph , Optimal Binary Search Trees , Knapsack Problem and Memory functions.

Greedy Technique –Prim's algorithm and Kruskal's Algorithm , Fractional Knapsack problem, Optimal Merge pattern – Huffman Trees.

UNIT-IV

Backtracking: General method, applications−n-queen problem, sum of subsets problem,graph coloring, Hamiltonian cycles.

Branch and Bound: General method, applications - Traveling Salesperson Problem, 0/1 knapsack problem, Assignment problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT-V

NP-Hard and NP-Complete problems: NP Hard and NP completeness: Basic concepts, cook's theorem, NP-hard graph problems and scheduling problem, NP- hard code generation problems, Clique Decision problem, Node covering problem, scheduling problem, NP hard code generation problem.

Approximation Algorithms for NP-Hard Problems – Traveling Salesman problem,Knapsack problem.

Text Books

- Horowitz, E., Sahni, S., and Rajasekaran, S. (2019). Fundamentals of Computer Algorithms. University Press.
- Cormen, T. H., Leiserson, C. E., Rivest, R. L., and Stein, C. (2001). Introduction to Algorithms, Second Edition. Pearson Education.

References

1. A. V. Levitin, "Introduction to the Design and Analysis of Algorithms," Addison-Wesley Longman Publishing Co., Inc., Boston, MA, USA.
2. A. Aho, J. Ullman, and M. Hopcroft, "Design and Analysis of Algorithms," Pearson Education.
3. M. T. Goodrich and R. Tamassia, "Algorithm Design: Foundations, Analysis and Internet Examples," John Wiley and Sons.

Course Code	Course Title					Course Type
CS2803	Design and Analysis of Algorithms Lab					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

- To develop proficiency in programming algorithms using C/C++.
- To introduce the fundamental concepts of data structures and algorithms.
- To provide practical experience in implementing various data structures and algorithms.
- To understand the techniques used in solving various computational problems.
- To develop problem-solving skills and logical reasoning.

Course Outcomes

At the end of the course the students will have the

1. Ability to write C/C++ programs for various algorithms and data structures.
2. Knowledge of fundamental concepts and terminology related to data structures and algorithms.
3. Proficiency in implementing basic data structures such as linked lists, trees, and graphs.
4. Ability to analyze the time and space complexity of algorithms using asymptotic notations.
5. Problem-solving skills using different algorithmic paradigms such as divide-and-conquer, dynamic programming, greedy algorithms, and backtracking.

List of Experiments:

All the problems have to be implemented either writing C programs or writing C++ programs. Elementary Problems:

1) Using a stack of characters, convert an infix string to a postfix string.
2) Implement polynomial addition using a single linked list
3) Implement insertion, deletion, searching of a BST, Also write a routine to draw the BST horizontally.
4) Implement binary search and linear search in a program
5) Implement heap sort using a max heap.
6) Implement DFS/ BFS routine in a connected graph
7) Implement Dijkstra's shortest path algorithm using BFS
8) Greedy Algorithm (Any Two)
    a) Given a set of weights, form a Huffman tree from the weight and also find oot the code corresponding to each weight.
    b) Take a weighted graph as an input, find out one MST using Kruskal/ prim's algorithm
    c) Given a set of weight and an upper bound M – Find out a solution to the Knapsack problem
9) Divide and Conquer Algorithm (any Two)
    a) Write a quick sort routine, run it for a different input sizes and calculate the time of

running. Plot in graph paper input size versus time.

b) Implement two way merge sort and calculate the time of sorting

c) Implement Strassen's matrix multiplication algorithm for matrices whose order is a power of two.

10)Dynamic programming

a.Given two sequences of character, find out their longest common subsequence using dynamic programming

Course Code	Course Title					Course Type
CS2201	Web Technologies					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To understand the basics of Web Designing using HTML, DHTML, and CSS
- To learn the basics about Client side scripts and Server side scripts

Course Outcomes

At the end of the course the students will have the

1. Ability to design and develop client side scripting techniques
2. Ability to build real world applications using client side and server side scripting languages

Detailed Contents

Unit – I

HTML- List, Tables, Images, Forms, Frames, Cascading Style sheets. XML- Document type definition, XML Schemas, Document Object model

Unit – II

Java Script -Control statements, Functions, Arrays, Objects, Events, Dynamic HTML with Java Script, Ajax

Unit – III

Web servers – IIS (XAMPP, LAMPP) and Tomcat Servers. Java Web Technologies- Servlets, JavaServer Pages, Java Server Faces, Web Technologies in Netbeans, Building a Web Application in Netbeans, JSF Components, Session Tracking, Cookies

Unit – IV

PHP- Basics, String Processing and Regular Expressions, Form Processing and Business Logic, Using Cookies, Dynamic Content, Operator Precedence Chart

Unit – V

Database Connectivity with MySQL - Servlets, JSP, PHP. Case Studies- Student information system,

Health Management System
Text Books ● Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, “Internet & World Wide Web How to Program”, Deitel series, 5th edition, 2012 ● Jason Gilmore, “Beginning PHP and MySQL From Novice to Professional”, 4th Edition, Apress Publications, 2010
References 1. Robert W. Sebesta, “Programming with World Wide Web”, Pearson, 4th edition, 2008 2. David William Barron, “The World of Scripting Languages”, Wiley Publications, 2000

Course Code	Course Title					Course Type
CS2801	Web Technologies Lab					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

1. To learn the basics in web designing using HTML, CSS, and XML
2. To develop web applications using JSP, Servlets, PHP, and Net Beans

Course Outcomes

At the end of the course the students will have the

1. Ability to design and develop web pages using HTML, CSS, and XML
2. Ability to design and deploy real world applications using client side and server side scripting languages

List of Experiments

- Designing static web pages using HTML
- Designing dynamic web pages using different cascading style sheets
- Designing XML Schemas
- Programs using Java Script
- Programs using Java servlets and JSP
- Designing web applications using PHP
- Designing web applications in Net Beans Environment
- Database Connectivity with MySQL using Java Servlets, JSP, and PHP

Course Code	Course Title					Course Type
CS2202	Operating System					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management in contemporary OS
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects of concurrency management.

Course Outcomes

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement a file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of
6. a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Detailed Contents

UNIT-I

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS – Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. System call interface for process management-fork, exit, wait, waitpid, exec

Unit 2:

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multi threads. Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. Scheduling algorithms: Pre-emptive and Non-preemptive, FCFS, SJF, RR, Priority, Preemptive Priority, SRTF.

Unit 3:

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion,Hardware Solution, Strict Alternation, Peterson's Solution, The Producer-Consumer Problem, Semaphores, Message Passing. Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem etc.Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm(Safety & Resource request algorithm), Deadlock detection and Recovery.

Unit 4:

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Least Recently used (LRU).

Unit 5:

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN,LOOK,C-LOOK,Disk reliability, Disk formatting, Boot-block, Bad blocks.

Text Books:

- Silberschatz, A., Galvin, P.B., & Gagne, G. (2013). Operating System Concepts Essentials, 9th Edition. Wiley Asia Student Edition.

References

1. A. Silberschatz, P. Galvin, and G. Gagne, Operating System Concepts Essentials, 9th ed. Wiley Asia Student Edition.
2. W. Stallings, Operating Systems: Internals and Design Principles, 5th ed. Prentice Hall of India.
3. C. Crowley, Operating System: A Design-oriented Approach, 1st ed. Irwin.
4. G. J. Nutt, Operating Systems: A Modern Perspective, 2nd ed. Addison-Wesley.
5. M. Bach, Design of the Unix Operating Systems, 8th ed. Prentice-Hall of India.
6. D. P. Bovet and M. Cesati, Understanding the Linux Kernel, 3rd ed. O'Reilly and Associates.

Course Code	Course Title					Course Type
CS2802	IT Workshop					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

- The objective of this course is to teach students how to use various tools and technologies for scientific computing and data analysis. By the end of the course, students will have gained proficiency in manipulating and analyzing data, creating professional scientific documents, and presenting results visually. The course covers topics such as Unix commands, LaTeX, PHP, NumPy, Matplotlib, Scipy, and statistical analysis in Python using seaborn.

Course Outcomes

This course teaches students to:

1. Use Unix commands for file management and text processing.
2. Create professional-looking scientific documents using LaTeX.
3. Write PHP scripts for web development and connect to MySQL databases.
4. Use NumPy for scientific computing and perform numerical operations on arrays.
5. Create and customize plots using Matplotlib.
6. Process and manipulate images using NumPy and Scipy.
7. Conduct statistical analysis in Python using seaborn for visualization, and hypothesis testing, linear models, and analysis of variance.

Week1

Basic Unix commands

Week2

sed, grep, sort, ssh,awk,shutdown,ftp,service,chown,chmod

Week3

Latex:Introduction, Document Structure,Essentials ,Troubleshooting Creating a Title, Sections ,Labelling,Table of Contents. Typesetting Text: Font Effects, Coloured Text ,Font Sizes ,Lists ,Comments & Spacing,Special Characters.

Week4

Tables, Figures

Equations: Inserting EquationsMathematical Symbols,Practical Inserting References: Introduction,The BibTeX file ,Inserting the bibliography,Citing references,Styles,Practical

Week5

Introduction to PHP Declaring Variables,Data types, Arrays, Strings,Operators,Expressions,Control Structures, Functions, Reading data from Web forms,

Week6

Handling file uploads,Connecting to database (MySQL), Executing Sample Queries, Handling Results, Handling Sessions and Cookiess

Week7

The NumPy array object, What are NumPy and NumPy arrays, Creating arrays, Basic data types, Basic visualization, Indexing and slicing, Copies and views, Fancy indexing, Numerical operations on arrays

Elementwise operations, Basic reductions, Broadcasting, Array shape manipulation, Sorting data

Week8

Matplotlib: plotting

Introduction, Simple plot, Figures, Subplots, Axes and Ticks, different types of Plots: examples and exercises

Week9

Image manipulation and processing using Numpy and Scipy

Opening and writing to image files,Displaying images, Basic manipulations- Statistical information, Geometrical transformations, Image filtering – Blurring/smoothing, Sharpening, Denoising, Mathematical morphology, Feature extraction- Edge detection, Segmentation

Week10

High-level scientific computing

File input/output, Special functions, Linear algebra operations, Interpolation: scipy.interpolate, Optimization and fit, Statistics and random numbers

Week 11

High-level scientific computing

Numerical integration, Fast Fourier transforms, Signal processing, Image manipulation

Week12

Statistics in Python, Data representation and interaction, Hypothesis testing: comparing two groups,Linear models, multiple factors, and analysis of variance, More visualization: seaborn for statistical exploration

References

- J. Peek, G. Todino, and J. Strang, "Learning the Unix Operating System," 5th ed., Sebastopol, CA, USA: O'Reilly Media, Inc., 2001.
- L. Lamport, "LaTeX: A Document Preparation System," 2nd ed., Reading, MA, USA: Addison-Wesley Professional, 1994.
- L. Ullman, "PHP and MySQL for Dynamic Web Sites," 5th ed., Berkeley, CA, USA: Peachpit

Press, 2017.
- W. McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython," 2nd ed., Sebastopol, CA, USA: O'Reilly Media, Inc., 2017.

Engineering 3 - Semester 2

Course Code	Course Title					Course Type
HS3203	Soft Skills					HSMC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	2	40	60	1

Course Objectives

- To make the students efficient communicators via experiential learning.
- To enhance learners' analytical and creative skills, so that they will be capable of addressing a wide variety of challenges in their professional lives.
- To help learners to improve the leadership qualities and professional etiquette
- To expose learners to an effective communicative environment.

Course Outcomes

1. Develop interpersonal communication, small group interactions and public speaking.
2. Develop confidence and skills related to reading comprehension.
3. Improve a logical framework for the critical analysis of spoken, written, visual and mediated messages upon diverse platforms.
4. Demonstrate the ability to apply vocabulary in practical situations.

Detailed Contents

UNIT-I

Introduction to communication Introduction – Importance of Communication Skills – Definition – Scope and Nature – Verbal andNonverbal communication

UNIT-II

Reading Skills Reading Comprehension of unseen passage – Prose – News Paper Reading and Analysis (Editorial), Novels, different research articles, crack the answers in the unseen paragraphs in the competitive exams etc….

UNIT-III

Functional Grammar

1. Parts of Speech (Functional Usage)
2. Subject and predicate (useful at workstations)
3. Conjunctions-Gap fillers (Linkers; connectors; cohesive devices)
4. Verbs & Verb patterns (Transitive and Intransitive - Finite and Infinite - Regular and Irregular – Modals)
5. Tenses (Various Applications)
6. Prepositions/ Prepositional verbs (idiomatic expressions, one word substitutions, phrasal verbs)

7. Adjectives (describing, narrating, effective presentation)

UNIT-IV

Enhancing Vocabulary, Developing Professional vocabulary, different forms of verbs (verb forms: v1, v2, v3) – Using Dictionary: Spelling – jargon specific vocabulary, context specific vocabulary, right choice of vocabulary etc…

UNIT-V

Composition Paragraph – Essay - Expansion - Describing the Pictures – Giving Directions – Situational Dialogue Writing – Social and Professional Étiquette – Telephone Etiquette, email etiquettes, Role plays, JAM, and elocution etc…

Text Books

- Communication skills by M. Raman and Sangeeta Sharma

References

1. Joseph Mylal Biswas book of English Grammar
2. R. Murphy - Cambridge Press
3. Wren and Martin
4. The Good Grammar book by OUP
5. How to Win Friends and Influence people by Dale Carnigie
6. How to Read and Write Better by Norman Lewis
7. Better English by Norman Lewis
8. Use of English Collocations by OUP
9. www.humptiesgrammar.com
10. www.bbcenglisgh.com
11. www.gingersoftware.com
12. www.pintest.com

Course Code	Course Title					Course Type
EC3203	Introduction to Internet of Things					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- Students will understand the concepts of Internet of Things and be able to build IoT applications.

Course Outcomes

1. The Student is expected to design and develop an IoT real-world application in a specific domain armed with knowledge of Python and choosing hardware for specific application.

Detailed Contents

UNIT-I

Introduction & Concepts Introduction & Concepts: Introduction to Internet of Things- Definitions & Characteristics of IoT, Physical Design of IOT-Things in IoT, IoT Protocols, Logical Design of IOT-IoT Functional Blocks, IoT Communication Models, IoT Communication APIs, IOT Enabling Technologies-Wireless Sensor Networks, Cloud Computing, Big Data Analytics,Communication Protocols, Embedded Systems, IOT Levels & Deployment Templates.

UNIT-II

Domain Specific IoTs and M2M IoT applications for Home Automation, Cities, Environment, Energy,Retail, Logistics, Agriculture, Industry, health and Lifestyle IoT and M2M – Introduction to M2M, Similarities and Differences between IoT and M2M.

UNIT-III

IoT Platforms Design Methodology Introduction, IoT Design Methodology Steps-Purpose and Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level Specification, Functional View Specification, Operational View R22, Electronics and Communications Engineering Page 165 Specification, Device and Component Integration, Application Development, Case Study on IoT System for Weather Monitoring.

UNIT-IV

Introduction to Python Motivation for using Python for designing IoT systems, Language features of Python, Data types- Numbers, Strings, Lists, Tuples, Dictionaries, Type Conversions, Data Structures: Control of flow-if, for, while, range, break/continue, pass, functions, modules, packaging, file handling, data/time operations, classes, Exception handling, Python packages of Interest for IoT - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT-V

IoT Physical Devices and End Points Basic building blocks of an IoT device, Rasberry Pi-About theRasberry Pi board, Rasberry Pi interfaces-Serial, SPI,I2C, Interfacing an LED and switch with RPi and controlling. Other IoT Devices- pcDuino, BeagleBone Black, CubieboardIoT

Text Books

- Misra, S., Mukherjee, A., & Roy, A. (2022). Introduction to IoT. Wiley.

References

1. V. Madisetti and A. Bahga, "Internet of Things (A Hands-on-Approach)," 1st ed., VPT, USA: VPT, 2014.
2. F. daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything," 1st ed., Apress, USA: Apress Publications, 2013.

Course Code	Course Title					Course Type
CS3201	DevOps					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	60	40	3

Course Objectives

- Understand the skill sets and high-functioning teams involved in Agile, DevOps and related
- methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle

Course Outcomes

At the end of the course, student will be able to

1. Understand the various components of the DevOps environment.
2. Identify Software development models and architectures of DevOps
3. Use different project management and integration tools.
4. Select an appropriate testing tool and deployment model for project.

UNIT-I

Introduction to DevOps:

Introduction, Agile development model, DevOps and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, identifying bottlenecks.

UNIT-II

Software development models and DevOps:

DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Micro services and the data tier, DevOps, architecture, and resilience.

UNIT-III

Introduction to project management:

The need for source code control, the history of source code management, Roles and code, source code management system and migrations, shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT-IV

Integrating the system:

Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT-V

Testing Tools and Deployment:

Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development. Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

Text Books

- Joakim Verona., Practical DevOps, Packt Publishing, 2016

References

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley
2. publications.
3. 2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison
4. Wesley

Course Code	Course Title					Course Type
CS3801	DevOps Lab					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

- Develop a sustainable infrastructure for applications and ensure high scalability. DevOps aims to shorten the software development lifecycle to provide continuous delivery with high-quality.

Course Outcomes

1. Understand the need of DevOps tools
2. Understand the environment for a software application development
3. Apply different project management, integration and development tools
4. Use Selenium tool for automated testing of application

List of experiments:

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application for exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

Course Code	Course Title					Course Type
CS3202	Machine Learning					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
Knowledge on statistical methods	3	0	0	40	60	3

Course Objectives

- To provide an introduction to the field of machine learning and its applications
- To teach the fundamental concepts of linear regression, decision trees, instance-based learning, and clustering
- To enable students to understand the basics of artificial neural networks and support vector machines
- To introduce students to ensemble learning techniques and recommender systems
- To provide hands-on experience in implementing machine learning algorithms using Python

Course Outcomes

1. Understand the basic concepts of machine learning and its applications
2. Apply linear regression and decision tree learning techniques to real-world problems
3. Understand and apply instance-based learning and clustering algorithms
4. Implement artificial neural networks and support vector machines
5. Apply ensemble learning techniques and develop recommender systems
6. Use Python to implement machine learning algorithms and evaluate their performance

Detailed Contents

UNIT I

Introduction: Introduction to Machine Learning: Introduction. Different types of learning, Hypothesis space and inductive bias, Evaluation. Training and test sets, cross validation, Concept of over fitting, under fitting, Bias and Variance.

Linear Regression: Introduction, Linear regression, Simple and Multiple Linear regression, Polynomial regression, evaluating regression fit.

UNIT II

Decision tree learning: Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning, Python exercise on Decision Tree.

Instance based Learning: K nearest neighbor, the Curse of Dimensionality, Feature Selection: forward search, backward search, univariate , multivariate feature selection approach, Feature reduction (Principal Component Analysis) , Python exercise on kNN and PCA.

Recommender System: Content based system, Collaborative filtering based.

UNIT III

Probability and Bayes Learning: Bayesian Learning, Naïve Bayes, Python exercise on Naïve Bayes, Logistic Regression.

Support Vector Machine: Introduction, the Dual formulation, Maximum margin with noise, nonlinear SVM and Kernel function, solution to dual problem.

UNIT IV

Artificial Neural Networks: Introduction, Biological motivation, ANN representation, appropriate problem for ANN learning, Perceptron, multilayer networks and the back propagation algorithm,

UNIT V

Ensembles: Introduction, Bagging and boosting, Random forest, Discussion on some research papers.

Clustering: Introduction, K-mean clustering, agglomerative hierarchical clustering, Python exercise on k-mean clustering.

Text Books

- Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.

References

1. T. Mitchell, "Machine Learning," First Edition, McGraw-Hill, 1997.
2. E. Alpaydin, "Introduction to Machine Learning," MIT Press, 2020.
3. C. Bishop, "Pattern Recognition and Machine Learning," Springer, 2007.

Course Code	Course Title					Course Type
CS3802	Machine Learning Lab					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

- The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.

Course Outcomes

After the completion of the course the student can able to:

1. Understand complexity of Machine Learning algorithms and their limitations;
2. Understand modern notions in data analysis-oriented computing;
3. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments

1. Basic exercises on Python Machine Learning Packages such as Numpy, Pandas and matplotlib.
2. Given a dataset. Write a program to compute the Covariance, Correlation between a pair of attributes. Extend the program to compute the Covariance Matrix and Correlation Matrix.
3. Given a set of sample points in N dimensional feature space. Write a program to fit the points with a hyper plane using Linear Regression. Calculate sum of residual error.
4. Write a program that provides option to compute different distance measures between two points in the N dimensional feature space. Consider some sample datasets for computing distances among sample points.
5. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
6. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Python ML library classes can be used for this problem.
7. Write a program to implement feature reduction using Principle Component Analysis
8. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
9. Given a dataset for classification task. Write a program to implement Support Vector Machine and estimate its test performance.
10. Write a program to implement perceptron for different learning tasks.
11. Write programs to implement ADALINE and MADALINE for a given learning task.
12. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
13. Write a program to implement K means clustering algorithm. Select your own dataset to test the program. Demonstrate the nature of output with varying value of K.

Course Code	Course Title					Course Type
CS3203	Automata Theory and Compiler Design					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	4

Course Objectives

- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- To understand deterministic and non-deterministic machines and the differences between decidability and undecidability.
- Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directed translation, type checking use of symbol tables, intermediate code generation

Course Outcomes

1. Able to employ finite state machines for modeling and solving computing problems.
2. Able to design context free grammars for formal languages.
3. Able to distinguish between decidability and undecidability.
4. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
5. Acquire skills in using lex tool and design LR parsers

Detailed Contents

UNIT-I

Introduction: Alphabet, Languages and grammars, productions and derivations, Chomsky hierarchy of languages. Regular Languages and finite automaton: Regular Expressions and languages, deterministic finite automaton and Equivalence with regular expressions, Non deterministic finite automaton (NFA) and Equivalence with DFA, minimization of finite automata.

Regular languages: regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages.

UNIT-II

Context free languages: Context free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, pumping lemma for context free languages, parse trees, ambiguity in CFG, closure properties of CFLs.

Pushdown automata: Deterministic Push down automata (PDA), non deterministic Push down automata (PDA) Context sensitive languages, Context sensitive grammars.

UNIT-III

Turing Machine: Basic model for TM, Turing recognizable (recursively enumerable) and Turing-decidable(recursive) languages and their closure properties, variants of Turing Machines, Non

deterministic TMs .

Undicidability: Church-Turing thesis, universal turing machine, the universal and diagnolization languages, undecidable problems about languages.
Introduction – Language Processors, Structure of a compiler- phases of compiler design and overview. Applications of compiler Technology.
Lexical analysis: The role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, Lexical errors, error recovery in lexical analysis phase, The Lexical-Analyzer Generator Lex.

UNIT-IV
Syntax Analysis –Top-Down parsing: Brute Forcing, Recursive Descent parsing, LL (1) parsing, Bottom-Up parsing : Shift reduce parsing, conflicts during shift reduce parsing, Introduction to LR Parsing: LR(0), simple LR, powerful LR parsers: CLR, LALR, conflicts, Parser Generators – Yacc. Error Recovery: Introduction, Error detecting and Reporting, Syntax Errors handling.

UNIT-V
Semantic Analysis – Introduction, semantic errors, attribute grammars
Syntax Directed Translation – Syntax Directed Definitions, Evaluation Orders for SDDs. Applications of Syntax Directed Translation. Symbol Table Organization
Intermediate code generation – Variants of syntax trees, Three-Address Code, Types and Declarations, Translation of Expressions, Type Checking.
Run time Environment – storage organization, Stack allocation of space, activation records, and Access to non local data.
Code Generation – Issues in the Design of a Code Generator, the Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks. Peephole Optimization, Register Allocation and Assignment, Instruction Scheduling. Machine Independent Optimizations – The Principal Sources of Optimizations.

Text Books

- J. E. Hopcroft and J. D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson education Asia.
- K. D. Cooper and L. Torczon, Engineering a Compiler, Morgan Kaufman, 2012.

References

1. A.V. Aho, Monica Lam, Ravi Sethi, and J.D. Ullman, "Compilers: Principles, Techniques, and Tools," 2nd ed., Addison-Wesley, 2007.
2. Harry R Lewis and Christos H Papadimitriou, "Elements of the Theory of Computation," Pearson education Asia.
3. Dexter C Kozen, "Automata and Computability," Undergraduate Texts in Computer Science, Springer.
4. Michael Sipser, "Introduction to the Theory of Computation," PWS publishing.
5. John Martin, "Introduction to Languages and the Theory of Computation," McGraw-Hill Education, 2003.
6. K.C. Louden, "Compiler Construction: Principles and Practice," Cengage Learning, 1997.

7. D. Brown, J. Levine, and T. Mason, "LEX and YACC," O'Reilly Media, 1992.

Course Code	Course Title					Course Type
CS3225	Human Computer Interaction					PEC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing;
- become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task
- performance by humans.
- Be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and recognize the limits of human performance as they apply to computer operation.
- Appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user.
- Be familiar with a variety of both conventional and non-traditional user interface paradigms, the latter including virtual and augmented reality, mobile and wearable computing, and ubiquitous computing; and understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems.
- Finally, working in small groups on a product design from start to finish will provide you with invaluable team-work experience.

Course Outcomes

1. Ability to apply HCI and principles to interaction design.
2. Ability to design certain tools for blind or PH people.

Detailed Contents

UNIT-I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT-II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of

information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT-III

Windows – New and Navigation schemes selection of window, selection of devices based and screen-based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT-IV

HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction.

UNIT-V

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right.

Text Books

- The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2, 3
- Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education Units 4,5

References

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen , Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

Course Code	Course Title					Course Type
CS3232	Adhoc Sensor Networks					PEC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Prerequisites:

1. A course on "Computer Networks".
2. A course on "Mobile Computing".

Course Objectives

- To understand the concepts of sensor networks.
- To understand the MAC and transport protocols for ad hoc networks.
- To understand the security of sensor networks.
- To understand the applications of adhoc and sensor networks.

Course Outcomes

1. Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and
2. Wireless Sensor Networks
3. Ability to solve the issues in real-time application development based on ASN.
4. Ability to conduct further research in the domain of ASN

Detailed Contents

UNIT-I

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs andChallenges of MANETs.Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms-Proactive: DSDV; Reactive: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-Location Services-DREAM, Quorum-based; Forwarding Strategies:Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT-II

Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

UNIT-III

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc.

UNIT-IV

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT-V

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

Text Books

- Corderio, C., & Aggarwal, D. P. (2006). Ad Hoc and Sensor Networks – Theory and Applications. World Scientific Publications. ISBN: 981-256-681-3.
- Zhao, F., & Guibas, L. (2004). Wireless Sensor Networks: An Information Processing Approach. Morgan Kauffman/Elsevier Science. ISBN: 978-1-55860-914-3.

References

1. C. Siva Ram Murthy and B.S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols," 2nd ed., Pearson Education, 2010.
2. Ivan Stojmenovic, "Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems," CRC Press, 2005.
3. Ian F. Akyildiz, Weilian Su, Yogesh Sankarasubramaniam, and Erdal Cayirci, "Wireless Sensor Networks: A Survey," Computer Networks, vol. 38, no. 4, pp. 393-422, 2002.
4. Mohammad Ilyas, "The Handbook of Ad Hoc Wireless Networks," CRC Press, 2003.
5. Jun Zheng and Abbas Jamalipour, "Wireless Sensor Networks: A Networking Perspective," Wiley, 2009.

Course Code	Course Title					Course Type
BM4414	Intellectual Property Rights					HSMC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	3

Course Objectives

- Master fundamental legal principles of intellectual property.
- Apply and assess these principles in real-world scenarios, while staying updated on evolving issues.

Course Outcomes

At the end of the course the student will be able to

1. Understand the fundamental legal principles relating to confidential information, copyright, patents, designs, trademarks and unfair competition;
2. Understand and be able to identify, apply and assess principles of law relating to each of these areas of intellectual property.
3. Understand the legal and practical steps needed to ensure that intellectual property rights remain valid and enforceable
4. Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;
5. Understand current and emerging issues relating to the intellectual property protection.

Detailed Contents

Unit-1:

Introduction to IPR: Definition of Intellectual Property, Meaning of Intellectual Property, Evolution of IPR, Kinds of Intellectual Property Rights - Patents, Trademarks, Copy Rights, Industrial Design, Trade Secrets, Geographical Indications, Agencies responsible for Intellectual Property Rights- USPTO, INTA, WIPO, TRIPS, International Conventions-Patent treaty, Madrid Protocol, Berne Convention.

UNIT-II:

Patent Rights: Introduction, Definition of Patent, Importance of Patents, Types of Patents, Patentable Inventions, Non- Patentable Inventions, Persons entitled to apply for Patent, Who can apply for a Patent, Expiry of a Patent, Rights of patentee, Registration of patent.

Unit-III:

Industrial designs: Definitions of Designs, Essentials of a Design, Who can file for Design Registration, Term of Design, Registration of Designs, Cancellation of a Registered designs, Restoration of a lapsed design.

Unit-IV:

Trademarks: Introduction to Trademark, Meaning of Trademark, Types of Trademark, Features of Trademarks, Functions of Trademarks, Objectives of Trademarks, What to avoid when selecting a Trademark, Trademark Registration procedure, Infringement of Trademarks, Passing off.

Unit-V:

Copy Right: Introduction, Subject matter of Copy Right, Objectives of Copy Rights, Rights of a copyright holder, Works covered under Copy Right, Works not covered under Copy Right, Duration of Copy Right, and Registration of Copy Right.

Case studies are discussed wherever applicable.

Text Books

- Dr. G.B. Reddy,Intellectual Property Rights and the Law 5th Ed. 2005 Gogia Law Agency
- Cornish.W.R, "Intellectual Property Patents", Copy Right and Trademarks and Allied rights, Sweet&Maxwell 1993.

References

1. P. Narayanan: Intellectual Property Law, Eastern Law House, 2nd edition 1997.
2. Roy Chowdhary, S.K. & Other:Law of Trademark, Copyrights, Patents and Designs, Kamal Law House, 1999.
3. B.L. Wadhera: Intellectual Property Law, Universal Publishers, 2nd Ed. 2000