R18

B.Tech. (INFORMATION TECHNOLOGY)

B.Tech. R18 CBCS Curriculum

VISION OF THE INSTITUTE

To be a World Class University providing value-based education, conducting interdisciplinary research in cutting edge technologies leading to sustainable development of the nation

MISSION OF THE INSTITUTE

➢ To produce technically competent and socially responsible engineers, managers and entrepreneurs, who will be future ready.

➢ To involve students and faculty in innovative research projects linked with industry, academic and research institutions in India and abroad.

➢ To use modern pedagogy for improving the teaching-learning process.

DEPARTMENT OF

INFORMATION TECHNOLOGY

VISION OF THE DEPARTMENT

To impart quality technical education that fosters critical thinking, dynamism and innovation to transform students into globally competitive IT professionals.

MISSION OF THE DEPARTMENT

➢ To provide quality education through innovative teaching and learning process that yields advancements in state-of-the-art information technology.

➢ To provide a learning environment that promotes quality research.

➢ To inculcate the spirit of ethical values contributing to the welfare of the society.

B.TECH.
(INFORMATION TECHNOLOGY)

B.TECH. (IT)

PROGRAM EDUCATIONAL OBJECTIVES

PEO-I: Graduates will be acquainted knowledge and to contribute theoretical, mathematical and scientific foundations which are flag stones on which Information Technologies are built, and engage in perennial learning by anticipating changing trends in Information Technology.

PEO-II: Graduates will meet the meticulous competitive admission procedure and requirements of national and international markets by exhibiting high qualifications gained through advanced training, independent learners, show team competence to design, analyze and solve real-world IT domain problems.

PEO-III: Graduates will gained research abilities to pursue their professional careers for self-advancement while meeting the requirements for professional instructors, lecturers, researchers, developers and entrepreneurs so as to cater the needs of both academic and industry.

PEO-IV: Graduates will be renowned in their preferred domains, acquire the potentiality and competency to exhibit intellectual breadth and lifelong intellectual curiosity essential to cater needs of IT industry creatively and responsibly in leading edge global and societal environments.

B.TECH. (IT)

PROGRAM OUTCOMES

PO-1: Apply mathematics, logical, statistical, and scientific principles, emphasizing computing and information processing.

PO-2: Identify and analyze the user needs and take them in to account for Selection, Creation, Evaluation and Administration of Computer-based systems.

PO-3: Understand software engineering and Testing principles and apply them to design, develop, implement and deploy with extensive security features.

PO-4: Engage actively in research, consulting, and other professional activities, both to advance individual professional competence and to integrate new knowledge into the educational programs.

PO-5: Use modern techniques and tools necessary for computing practice that drives towards entrepreneurship.

PO-6: Update their knowledge with the latest technologies by getting involved in projects benefiting the society and contributing to economic growth.

PO-7: Understand the impact of engineering solutions in a social and global environment and ensure sustainability of the solutions.

PO-8: Apply information technology principles and practices to a variety of problems, with the understanding of social, professional and ethical issues.

PO-9: Work effectively in teams with people of diverse backgrounds at all corporate levels.

PO-10: Demonstrate quality skills so as to speak listen and present effectively the acquired technical knowledge to a range of audience.

PO-11: Utilize project management skills and principles of finance and economics in the construction of hardware and software systems with business objective.

PO-12: Engage in lifelong learning to adopt or develop the technological advancements to meet the growing and changing societal needs.

B.TECH. (IT)

PROGRAM SPECIFIC OUTCOMES

PSO-1: The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of Information Technology.

PSO-2: Knowledge of data management system like data acquisition, big data so as to enable students in solving problems using the techniques of data analytics like pattern recognition and knowledge discovery.

PSO-3: Basic knowledge in hardware/software methods and tools for solving real-life and R&D problems with an orientation to lifelong learning.

PSO-4: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. I YEAR
(Common to CSE and IT)

I SEMESTER   **R18**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
18BS1MT01	Advanced Calculus	3	1	0	4	4
18BS1PH02	Engineering Physics	3	1	0	4	4
18ES1EE01	Basics of Electrical Energy for Engineers	3	1	0	4	4
18BS2PH02	Engineering Physics Laboratory	0	0	3	3	1.5
18ES2EE01	Basic Electrical Engineering Laboratory	0	0	3	3	1.5
18ES3ME02	Engineering Drawing	1	0	4	5	3
18PW4CS01	Design Sensitization	0	0	2	2	1
Total		**10**	**3**	**12**	**25**	**19**
18MN6HS01	Induction Programme	-	-	-	-	-

II SEMESTER   **R18**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
18BS1MT02	Linear Algebra and Ordinary Differential Equations	3	1	0	4	4
18BS1CH01	Engineering Chemistry	3	1	0	4	4
18HS1EN01	English	2	0	0	2	2
18ES1CS01	Programming through C	3	0	0	3	3
18BS2CH01	Engineering Chemistry Laboratory	0	0	3	3	1.5
18HS2EN01	English Language Communication Skills Laboratory	0	0	2	2	1
18ES2CS01	Programming through C Laboratory	0	0	4	4	2
18ES2ME01	Workshop Practices	1	0	3	4	2.5
Total		**12**	**2**	**12**	**26**	**20**

L – Lecture   T – Tutorial   P – Practical   D – Drawing

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. II YEAR
(Common to CSE and IT)

III SEMESTER   R18

Course Code	Title of the Course	L	T	P	Contact Hours/ Week	Credits
18BS1MT07	Probability, Statistics and Queuing Theory	3	0	0	3	3
18ES1CS02	Digital Logic Design	3	0	0	3	3
18PC1IT01	Data Structures	3	0	0	3	3
18PC1CS01	Mathematical Foundations for Computer Science	3	0	0	3	3
18PC1CS02	Object Oriented Programming through C++	3	0	0	3	3
18PC1IT02	Computer Organization	3	0	0	3	3
18PC2IT01	Data Structures Laboratory	0	0	3	3	1.5
18PC2CS01	Object Oriented Programming through C++ Laboratory	0	0	3	3	1.5
	Total	**18**	**0**	**6**	**24**	**21**
18MN6HS02	Environmental Sciences	2	0	0	2	0

IV SEMESTER   R18

Course Code	Title of the Course	L	T	P	Contact Hours/ Week	Credits
18HS1MG01	Engineering Economics and Accountancy	3	0	0	3	3
18PC1CS03	Software Engineering	3	0	0	3	3
18PC1IT03	Java Programming	3	0	0	3	3
18PC1IT04	Formal Languages and Automata Theory	3	0	0	3	3
18PC1CS04	Design and Analysis of Algorithms	3	0	0	3	3
18PC1CS05	Database Management Systems	3	0	0	3	3
18PC2IT02	Java Programming Laboratory	0	0	3	3	1.5
18PC2CS02	Database Management Systems Laboratory	0	0	3	3	1.5
18PC2IT03	IT Workshop	0	0	2	2	1
	Total	**18**	**0**	**8**	**26**	**22**

L – Lecture   T – Tutorial   P – Practical

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. III YEAR
(INFORMATION TECHNOLOGY)

V SEMESTER R18

Course Code	Title of the Course	L	T	P	Contact Hours/ Week	Credits
18PC1IT05	Operating Systems	3	0	0	3	3
18PC1CS11	Compiler Design	3	1	0	4	4
18PC1IT06	Computer Networks	3	0	0	3	3
	Professional Elective -I					
18PE1IT01	Agile Software Process					
18PE1IT02	Data Mining					
18PE1CS01	Mobile Computing	3	0	0	3	3
18PE1CS05	Computer Graphics					
18PE1IT03	Cyber Security					
	Open Elective -I	3	0	0	3	3
18HS2EN02	Advanced English Communication Skills Laboratory	0	0	2	2	1
18PC2IT04	Operating Systems and Computer Networks Laboratory	0	0	2	2	1
18PW4IT03	Design Thinking	0	0	4	4	2
18PW4IT02	Internship*	0	0	2	2	1
	Total	**15**	**1**	**10**	**26**	**21**
18MN6HS03	Gender Sensitization	2	0	0	2	0

* Internship to be pursued during summer vacation after IV semester and evaluated in V semester

Course Code	Title of the Course	L	T	P	Contact Hours/ Week	Credits
18PC1CS07	Artificial Intelligence	3	0	0	3	3
18PC1CS08	Linux Programming	3	0	0	3	3
18PC1IT07	Web Technologies	2	1	0	3	3
18PC1CS09	Machine Learning	3	0	0	3	3
	Professional Elective -II					
18PE1IT04	Software Testing Methodologies					
18PE1CS03	Soft Computing					
18PE1IT05	Cloud Computing	3	0	0	3	3
18PE1IT06	Advanced Operating Systems					
18PE1CS09	Android Application Development					
	Open Elective -II	3	0	0	3	3
18PC2IT05	Web Technologies Laboratory	0	0	2	2	1
18PC2CS05	Machine Learning using Python Laboratory	0	0	2	2	1
	Total	**17**	**1**	**4**	**22**	**20**

L – Lecture   T – Tutorial   P – Practical

OE TRACKS BASED ON MEZZANINE TECHNOLOGIES:

OE TRACKS (Parent Department)	V SEMESTER	VI SEMESTER	VII SEMESTER	VIII SEMESTER
Smart Cities (CE)	Smart Cities Planning and Development **(18OE1CE01)**	Green Building Technology **(18OE1CE02)**	Smart Materials and Structures **(18OE1CE03)**	Intelligent Transportation System **(18OE1CE04)**
Waste Management (CE)	Solid Waste Management **(18OE1CE05)**	Hazardous Waste Management **(18OE1CE06)**	Waste to Energy **(18OE1CE07)**	Intelligent Waste Management and Recycling System **(18OE1CE08)**
Green Energy (EEE)	Renewable Energy sources **(18OE1EE01)**	Renewable Energy Technologies **(18OE1EE02)**	Energy Storage Technologies **(18OE1EE03)**	Energy Management and Conservation **(18OE1EE04)**
3D Printing and Design (ME)	Elements of CAD **(18OE1ME01)**	Introduction to 3D Printing **(18OE1ME02)**	3D Printing - Machines, Tooling and Systems **(18OE1ME03)**	Reverse Engineering **(18OE1ME04)**
Internet of Things (ECE)	Sensors Transducers and Actuators **(180E1EC01)**	Introduction to Microcontrollers and Interfacing **(180E1EC02)**	IoT Protocols and its applications **(180E1EC03)**	Wireless Sensor Networks **(18OE1EC08)**
Augmented Reality (AR) / Virtual Reality (VR) (ECE)	Introduction to C Sharp **(180E1EC04)**	Introduction to Signal Processing **(180E1EC05)**	Introduction to Image and Video Processing **(180E1EC06)**	Applications of AR and VR **(18OE1EC07)**
Artificial Intelligence (CSE)	Mathematics for Artificial Intelligence **(18OE1MT02)**	Fundamentals of Artificial Intelligence **(18OE1CS01)**	Machine Learning Techniques **(18OE1CS02)**	Deep Learning **(18OE1CS03)**
Blockchain Technologies (CSE)	Fundamentals of Computer Networks **(18OE1CS04)** / Relational Data Base Management Systems **(18OE1CS08)**	Distributed Data Bases **(18OE1CS05)**	Cryptography and Network Security **(18OE1CS06)**	Blockchain Technology **(18OE1CS07)**
Robotics (EIE)	Fundamentals of Robotics **(18OE1EI01)**	Kinematics and Dynamics of Robotics **(18OE1EI02)**	Drives and Control Systems for Robotics **(18OE1EI03)**	Robot Programming and Intelligent Control Systems **(18OE1EI04)**
Cyber Security (IT)	Fundamentals of Computer Networks **(18OE1CS04)** / Relational Data Base Management Systems **(18OE1CS08)**	Cryptography and Network Security **(18OE1CS06)**	Essentials of Cyber Security **(18OE1IT01)**	Computer Forensics **(18OE1IT02)**
Data Sciences / Big Data and Analytics (IT)	Statistical Methods for Data Science **(18OE1MT03)**	Computational Thinking using Python **(18OE1IT03)**	Fundamentals of Data Mining **(18OE1IT04)**	Data Analysis and Visualization **(18OE1IT05)**
Autonomous Vehicles (AME)	Principles of Automobile Engineering **(18OE1AE01)**	Modern Automotive Technologies **(18OE1AE02)**	Electric, Hybrid and Fuel Cell Vehicles **(18OE1AE03)**	Connected and Autonomous Vehicles **(18OE1AE04)**

GENERAL POOL OF OE COURSES:

OE TRACKS (Parent Departments)	COURSES
General-Computing (CSE / IT)	• Programming through Java **(18OE1IT06)** • Relational Data Base Management Systems **(18OE1CS08)** • Computational Thinking using Python **(18OE1IT03)** • Introduction to Data Analytics **(18OE1IT07)** • Fundamentals of Computer Algorithms **(18OE1CS11)**
General (H&S)	• Professional Ethics and Human Values (**18OE1HS01**) • Entrepreneurship (**18OE1HS02)** • Personality Development and Public Speaking (**18OE1HS03)** • Foreign Language-French/German (**18OE1HS04)**
General	• Smart Cities **(18OE1CE09)** • Trends in Energy Sources for Sustainable Development **(18OE1EE05)** • 3D Printing and Design **(18OE1ME05)** • Embedded Systems for IoT **(18OE1EC09)** • Artificial Intelligence - A Beginner's Guide **(18OE1CS09)** • Blockchain Technology Essentials **(18OE1CS10)** • Fundamentals of Robotics and Drones **(18OE1EI05)** • Fundamentals of Cyber Security **(18OE1IT08)** • Fundamentals of Data Science **(18OE1IT09)** • Introduction to Advanced Vehicle Technologies **(18OE1AE05)**

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. IV YEAR
(INFORMATION TECHNOLOGY)

VII SEMESTER **R18**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
18PC1IT08	Data Analytics	2	1	0	3	3
18HS1MG02	Principles of Management and Organizational Behavior	3	0	0	3	3
	Professional Elective - III					
18PE1CS04	Software Project Management	3	0	0	3	3
18PE1CS06	Scripting Languages					
18PE1IT07	Semantic Web					
18PE1EC08	Internet of Things					
18PE1IT08	Security in E-Commerce					
	Professional Elective - IV					
18PE1IT09	Design Patterns	3	0	0	3	3
18PE1CS02	Augmented Reality and Virtual Reality					
18PE1IT10	Ad-hoc and Sensor Networks					
18PE1CS16	Natural Language Processing					
18PE1IT11	Network Management System					
	Open Elective - III	3	0	0	3	3
18PC2IT06	Data Analytics Laboratory	0	0	2	2	1
18PW4IT04	Mini-Project*	0	0	4	4	2
18PW4IT05	Major Project Phase - I	0	0	8	8	4
	Total	**14**	**1**	**14**	**29**	**22**

* Mini-Project to be pursued during summer vacation after VI semester and evaluated in VII semester

Course Category	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
	Professional Elective – V					
18PE1IT12	Distributed Systems	3	0	0	3	3
18PE1CS10	Neural Networks and Deep Learning					
18PE1CS12	Quantum Computing					
18PE1IT13	Network Security					
18PE1IT14	Advanced Databases					
	Professional Elective – VI					
18PE1IT15	Data Visualization	3	0	0	3	3
18PE1CS14	Information Retrieval Systems					
18PE1IT16	Software Defined Networks					
18PE1CS17	Distributed Trust and Blockchain Technologies					
18PE1CS19	Cognitive Engineering					
	Open Elective – IV	3	0	0	3	3
18PW4IT06	Major Project Phase - II	0	0	12	12	6
Total		**9**	**0**	**12**	**21**	**15**

L – Lecture   T – Tutorial   P – Practical   D – Drawing

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester – Common to all branches

	L	T/P/D	C
	3	1	4

(18BS1MT01) ADVANCED CALCULUS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To learn geometrical approach to the mean value theorems and their application to the mathematical problem
- To learn concept of Sequence and Series
- To learn evaluation of improper integrals using Beta and Gamma functions
- To learn evaluation of multiple integrals and their applications
- To learn basic properties of vector point function and their applications to line, surface and volume integrals

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Solve problems involving mean value theorems
CO-2: Analyze the nature of convergence of sequence and series
CO-3: Evaluate integrals using special functions and change of variables
CO-4: Evaluate double and triple integrals
CO-5: Transform line integral to surface and surface to volume integrals

UNIT-I:
Calculus of Single and Several Real Variables: Mean value theorems–Rolle's Theorem, Lagrange's Mean value theorem Cauchy's Mean value theorem, Taylor's expansion and McLaurin's expansion of functions (without proofs). Partial differentiation, partial derivatives of first and second order in terms of partial derivatives, change of variables, Jacobian, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undetermined multipliers.

UNIT-II:
Sequences and Series: Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence, Power series.

UNIT-III:
Improper Integrals: Definition of Improper Integral: Beta and Gamma functions, Relation between the Beta and Gamma functions (without proof) and their applications, Standard forms of beta functions.

UNIT-IV:
Multiple Integrals: Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and

Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

UNIT-V:

Vector Differential Calculus: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities (without proofs). Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-VI:

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

TEXT BOOKS:
1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley
2. Higher Engineering Mathematics, B. V. Ramana, 11th Reprint, Tata McGraw-Hill, New Delhi, 2010

REFERENCES:
1. Calculus and Analytic Geometry, Thomas and Finney, 9th Edition, Pearson Education, 2002
2. Higher Engineering Mathematics, B. S. Grewal, 36th Edition, Khanna Publishers, 2010
3. Elementary Analysis: The Theory of Calculus, Kenneth Ross, Springer
4. Advanced Engineering Mathematics, Peter 'O' Neil, Cengage Learning

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester– Common to EEE, ECE, CSE, EIE & IT

L	T/P/D	C
3	1	4

(18BS1PH02) ENGINEERING PHYSICS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To comprehend various phenomena of light- Interference and Diffraction
- To understand the basic principles, working of lasers and optical fibers
- To learn and enhance the basic concepts in quantum physics required to deal with behavior of particle
- To understand behavior of an electron in a periodic potential in crystal
- To understand various types of semiconductors and semiconductor materials

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Realize the importance of Interference in thin films, Fraunhofer diffraction
CO-2: Analyze the lasing action of various laser sources and optical fiber materials elucidate the behavior of a particle quantum mechanically
CO-3: Classify solids based on band gap
CO-4: Perceive formation of PN junction and importance of semiconductor materials

UNIT-I:
Wave Optics: Superposition Principle, Coherence, Interference of light by wave front splitting and amplitude splitting; Interference in thin films by reflection, Newton's rings experiment by reflection- Calculation of wavelength, Farunhofer diffraction from a single slit, Double slit diffraction, Diffraction grating (Qualitative), and a circular aperture.

UNIT-II:
Lasers: Introduction, Characteristics of Lasers, Spontaneous And Stimulated Emission Of Radiation, Meta Stable State, Population Inversion, Lasing Action, Einstein's Coefficients And Relation Between Them, Ruby Laser, Helium-Neon Laser, Semiconductor Laser, Application of Lasers in Science, Engineering and Medicine, Propagation of LASER through Optical Fiber- Total Internal Reflection.

UNIT-III:
Principles of Quantum Mechanics: Introduction to Quantum Mechanics, Waves and particles, de Broglie hypothesis, Matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle, Schrodinger Time independent Wave Equation, Physical significance of wave function, Particle in one dimensional infinite potential box.

UNIT-IV:
Band Theory of Solids: Free electron theory of metals (Drude and Lorentz theory), Electrical conductivity and Ohm's law, Bloch's theorem for particles in a periodic potential, Kronig-Penney model (Qualitative only), E-K diagram and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators, Effective mass of an electron.

UNIT-V:

Semiconductors: Intrinsic semiconductors- Carrier concentration, dependence of Fermi level on carrier-concentration and temperature, Extrinsic Semiconductors (Qualitative), Continuity equation-Carrier generation and recombination, Carrier transport: diffusion and drift currents, Hall Effect, Hall Experiment, Measurement of Hall mobility, Resistivity, carrier density using Hall effect.

UNIT-VI:

Engineered Semiconductor Materials: Direct and Indirect band gap semiconductors, Formation of p -n junction, Energy diagram of diode, V-I characteristics of p-n junction diode, Working principle of LED, Working principle and V-I characteristics of Solar Cell – Parameters (short circuit current and open circuit voltage) extraction from I-V characteristics.

TEXT BOOKS:
1. Physics Vol. 2, Halliday, Resnick and Krane, John Wiley & Sons
2. Engineering Physics, R. K. Gaur and S. L. Gupta, Dhanpat Rai and Sons
3. Engineering Physics, B. K. Pandey and S. Chaturvedi, Cengage Learning

REFERENCES:
1. A Textbook of Engineering Physics, Dr. M. N. Avadhanulu and Dr P. G. Kshirsagar, S. Chand & Company PVT Ltd
2. Optics, A. Ghatak, McGraw-Hill Education, 2012
3. Applied Physics, P.K. Mittal, IK International Publishing House Pvt. Ltd.
4. Introduction to Solid State Physics, Charles Kittel, John Wiley & Sons
5. Engineering Physics, P. K. Palanisamy, Scitech Publications (India) Pvt. Ltd

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester– Common to EEE, ECE, CSE, EIE & IT

L	T/P/D	C
3	1	4

(18ES1EE01) BASICS OF ELECTRICAL ENERGY FOR ENGINEERS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the use of Electrical Energy in different engineering fields
- To analyze electrical circuits using different network theorems
- To know the working & construction of electrical machines, converters and electronic components
- To identify different LT electrical installation components and know the safety standards

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Appreciate the role of Electrical Energy in various engineering branches and to use different electronic components for system modelling
CO-2: Get familiarised with different electrical components and to find their suitability in the relevant fields of engineering
CO-3: Find the compatibility of Electrical Machines and Power Converters to different systems with required back ground knowledge
CO-4: Know about Low Voltage Electrical Installation components and the safety norms

UNIT-I:
Introduction to Electrical Energy & DC Circuits: The role of Electrical Energy in modern life and various engineering branches, Overview of electrical energy generation, Transmission, Distribution and Utilization, basic review of electrical potential and current, Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, series parallel connections, analysis of simple circuits with DC excitation, concept of linearity – Superposition theorem, time response of series RL and RC circuits.

UNIT-II:
Steady state A.C. Circuits: Representation of sinusoidal waveforms, average and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), series resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III:
Transformers and DC Machines: Role of Transformers in the fields of engineering, Transformer principle, Ideal and Practical Transformers, Equivalent circuit, Regulation and Efficiency, Auto Transformer, Three phase transformer connections (star- delta connections).
Basic Construction of DC machine, DC generator principle, Emf equation, DC motor principle, back emf, Load characteristics and speed control of separately excited dc motor.

UNIT-IV:
Alternating Current Machines: Three phase induction motor, types, principle, torque-Slip characteristics, power flow diagram, Single phase induction motor-principle-Double Field Revolving Theory, Working principle of Synchronous generator, Stepper motor- Applications.

UNIT-V:
Power Converters: Basics of AC to DC, DC to AC and DC to DC power converters-their necessity and applications in engineering (block diagram approach), UPS block diagram,
Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB and MCCB-Types of Wires and Cables - Earthing - Types of Batteries, charging and discharging- Electrical Characteristics for Batteries- Elementary calculations for energy consumption, electrical safety standards.

UNIT-VI:
Amplifiers, Transducers and Data Acquisition: Ideal operational amplifier, commercial IC 741 operational amplifier. Remote control and monitoring - Transducers, different types of transducers for measuring or sensing strain, temperature, acceleration, and light, examples. A/D and D/A converters, Data Acquisition and Control.

TEXT BOOKS:
1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill
2. Basic Electrical Engineering - D.C. Kulshreshtha, 2009, Tata McGraw Hill
3. Basic Electrical Engineering, Dr.P. Ramana, Dr. M. Suryakalavathi, Dr.G.T. Chandra Sekhar S. Chand Technical Publications

REFERENCES:
1. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
2. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989
3. Electrical and Electronics Measurements and Instrumentation, A.K. Sawhney, Dhanpat Rai & Co.
4. Fundamentals of Electrical Engineering, L.S. Bobrow, Oxford University Press, 2011
5. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th Edition

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester– Common to EEE, ECE, CSE, EIE & IT   L   T/P/D   C
                                                              0   3   1.5

(18BS2PH02) ENGINEERING PHYSICS LABORATORY

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To practically learn interaction of light with matter through physical phenomena like interference, diffraction and dispersion
- To understand the periodic motion and formation of standing waves and know the characteristics of the capacitors and resistors
- To study semiconductor devices
- To experience resonance phenomena
- To compare the experimental results with the class room learning

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the optical phenomena with formation of Newton Rings, pure spectrum through prism and to evaluate grating parameters
CO-2: Illustrate periodic motion by measuring rigidity modulus of a material and discharging of a capacitor
CO-3: Asses the various characteristics semiconductor devices
CO-4: Realize tangent law of magnetism and resonance phenomenon in Melde's and Sonometer experiment
CO-5: correlate the experimental results with the class room learning

1. **Spectrometer:** To determine the dispersive power of given prism using spectrometer
2. **Diffraction Grating:** To determine the wavelength of given laser and grating parameters
3. **Diffraction at Single Slit:** To determine the width of given wire.
4. **Newton's Rings Experiment:** To determine the radius of curvature of given plano convex lens
5. **RC Circuit:** To determine the time constant of RC circuit
6. **Optical fiber:** To determine Numerical aperture and Acceptance angle of a given optical fiber cable.
7. **Energy band gap of Semiconductor:** To determine Energy band gap of a semiconductor diode
8. **Light Emitting Diode:** To study the V-I characteristics of LED
9. **Solar Cell:** To study the V-I characteristics of Solar cell
10. **AC frequency by Sonometer:** To measure frequency of A.C mains
11. **Stewart Gee's experiment:** To verify Biot - Savart's law
12. **Melde's experiment:** To determine the frequency of electrical vibrator using resonance phenomenon

REFERENCES:
1. Engineering Physics laboratory Manual/Observation, Physics Faculty of VNRVJIET
2. Laboratory Manual of Engineering Physics, Dr. Y. Aparna & Dr. K. Venkateswara Rao, VGS Publications

3. Engineering Physics Practicals, Dr. B. Srinivasa Rao, Keshava Vamsi Krishna and K. S. Rudramamba, 2nd Edition, Laxmi Publications Pvt. Ltd. (University Science Press)

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester– Common to EEE,ECE,EIE,CSE & IT	L	T/P/D	C
	0	3	1.5

(18ES2EE01) BASIC ELECTRICAL ENGINEERING LABORATORY

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the construction of electrical equipment
- To recognize different circuit reduction techniques using theorems
- To practice the techniques to control and assess electrical machines
- To know different electric safety measures

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify different parts of electrical equipment and appreciate their purpose
CO-2: Apply different network theorems to solve complex electrical circuits
CO-3: Realize the compatibility of electrical machines in different engineering fields
CO-4: Control different electrical machines and evaluate their performance

PART – A
1. Demonstration of Safety Precautions, Measuring instruments and Electrical Components.
2. Identification of Ratings of resistors using color codes and Electrical circuit bread board practice
3. Demonstration of Cut-out sections of Electrical Machines.
4. Demonstration of LT Switchgear Components.
5. Demonstration of various converters and UPS.
6. Demonstration and study of Step response using Automatic Data Acquisition.

PART – B
1. Verification of KVL & KCL.
2. Verification of Superposition Theorem.
3. Time Response of RC and RL circuits.
4. Analysis of series RL, RC and RLC circuits
5. Load test on 1- φ Transformer
6. Speed control of DC shunt Motor.
7. Torque Speed Characteristics of Separately Excited DC motor.
8. Brake test on 3- φ Induction Motor.
9. Control of Synchronous generator voltage through its field excitation.
10. Constant Voltage and Constant Current charging of Batteries.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester– Common to EEE, ECE, EIE, CSE & IT

L	T/P/D	C
1	4	3

(18ES3ME02) ENGINEERING DRAWING

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To know the conventions used in Engineering Drawing and comprehend the tools to be used in AutoCAD software
- To understand the importance of engineering scales and curves
- To learn to use the orthographic projections for points, lines, planes and solids in different positions
- To understand the development of sections and isometric projections
- To create simple solid models of various domain applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the concepts of engineering curves in construction using AutoCAD
CO-2: Solve the problem of projections of points, lines, planes and solids in different positions using AutoCAD
CO-3: Solve the problems of Projections of solids and its positions using AutoCAD
CO-4: Solve the problems on Isometric Projections and its conversions using AutoCAD

Introduction to AutoCAD Software:
The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

UNIT-I:
Engineering Curves: Construction of Ellipse, Parabola and Hyperbola – General and Special methods; Cycloidal curves- Epicycloids and Hypocycloids.

UNIT-II:
Orthographic Projections:
Projections of Points & Straight Lines: Principles of Orthographic Projections - Conventions
Projections of Points in all positions; Projections of lines inclined to both the planes

UNIT-III:
Projections of Planes- Surface Inclined to both the Planes

UNIT-IV:
Projections of Regular Solids inclined to both the Planes – Prisms, Pyramids, Cylinder and Cone

UNIT-V:
Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and Compound Solids;

UNIT-VI:
Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions
Introduction to solid modelling: Creation of simple solid models relevant to the domain.

TEXTBOOKS:
1. Engineering Drawing, Bhatt N.D., Panchal V.M. & Ingle P.R.,Charotar Publishing House, 2014
2. Engineering Drawing and Computer Graphics,Shah, M.B. & Rana B.C., Pearson Education, 2008
3. Textbook on Engineering Drawing, Narayana, K.L. & P. Kannaiah, Scitech Publishers, 2008

REFERENCES:
1. AutoCAD Software Theory and User Manuals

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester– Common to CSE & IT

L	T/P/D	C
0	2	1

(18PW4CS01) DESIGN SENSITISATION

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To create awareness of design among students of engineering
- To motivate students to think of design before implementing an engineering project
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To instil a sense of significance towards applying creativity to product and service design

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Learn to identify design principles from an engineering perspective
CO-2: Cultivate sensitivity towards design aspects in objects made by engineers and non-engineers, which are typically used in daily life
CO-3: Understand and create visual design elements to communicate more effectively
CO-4: Construct clear problem statements, understand the importance of validation, and design services creatively
CO-5: Develop fundamental team skills: working in teams and managing teams, strategizing tasks, and streamlining activities pertaining to a project

Students' Responsibilities:
1. Students will form teams of 3–5 members each, while working collaboratively throughout the semester.
2. Students will present and report the tasks to the class and to the concerned faculty members and design experts, using their oral and written communication skills as well as creativity and team skills.
3. Students must proactively engage in observing the objects and processes which are part of their daily life and society from a design perspective and discuss with peers to learn collaboratively.

MODULE-1: Design Overview and Motivation
History and Context of birth of Design; Design thinking: Introduction and Motivation; Various definitions and interpretations of design, Design Vocabulary; Design in Indian Context; Art and Design: Art in Design, Design beyond Art; Design in Creative Industries

MODULE-2: Design Sensitisation for Engineers
Design Engineering vs. Engineering Design, Examples of Engineering Design and Design Engineering in various engineering domains, Examples of design failures leading to bad products and services, Real-world examples of bad design that caused engineering and technological disasters, Domain-specific Engineering Design examples

MODULE-3: Design Thinking Foundations

The Design Double Diamond: Discover-Define-Develop-Deliver

User-centric design approaches: Importance of user-centricity for design, Empathisation, Empathy Maps, Data collection from users and for users, Data Validation

Responsible Innovation and Ethical Design: Ethics as foundation for design, Concern for environment and sustainability

MODULE-4: Communication Skills for Design, Culture and Art

Communication Media to express an idea: Visuals, Text, Voice and Audio, Infographics

General guidelines for a good Presentation: Target audience, slideshow templates, appropriate visual elements, presentation styles, guidelines

General guidelines for a good Report: Documentation classification, standards, styles, and templates

Modes of communication: Reports and documents, Presentation, poster, graphic, blog or website.

Understanding Art in Design: Need for creativity, Elements of Visual Design

Design Aesthetics: Influences and impressions of Colours, Shapes, Layouts, Patterns, and Fonts as Design Elements

MODULE-5: Applied Creativity and Design for Services

Methods to brainstorm solutions for user issues; Combining solutions to workable solution concepts; Identifying the user needs in a service-driven economy; Process Flows and Customer Experience considerations for designing and improving services; 5 Why's; Service Delivery Pathways

MODULE-6: Doing Design

Looking for a problem, Ideation and Rules of Ideation, Framing and stating the problem; Basic considerations of Prototyping/ Model Building, Basics of Testing and Validation, Incorporating feedback

TEXT BOOKS:
1. Complete Design Thinking Guide for Successful Professionals, Daniel Ling, Create Space Independent Publishing, 2015 (ISBN: 978-1514202739)
2. Change by Design, Tim Brown, Harper Business, 2012 (ISBN: 978-0062337382)
3. Design Thinking for Startups: A Handbook for Readers and Workbook for Practitioners, Jimmy Jain, Notion Press, 2018 (ISBN: 978-1642495034)

REFERENCES:
1. The Design of Everyday Things, Donald A. Norman, MIT Press, 2013 (ISBN: 978-0262525671)
2. Design As Art, Bruno Munari, Penguin UK, 2009 (ISBN: 978-0141035819)
3. The Art of Innovation, Tom Kelly, Jonathan Littman, Harper Collins Business, 2002 (ISBN: 978-0007102938)
4. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Thomas Lockwood, Allworth Press, 2009 (ISBN: 978-1581156683)
5. Design Thinking for Entrepreneurs and Small Businesses: Putting the Power of Design to Work, Beverly Rudkin Ingle, APress, 2013 (ISBN: 978-1430261810)

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester– Common to CE, ME, CSE, IT & AE
L	T/P/D	C
3	1	4

(18BS1MT02) LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS

COURSE PRE-REQUISITES: Matrices, Differentiation and Integration

COURSE OBJECTIVES:
- To learn concept of Rank of the matrix and its application to consistency of system of linear equations
- To learn concept of Eigen Values and Eigen Vectors
- To learn nature of Quadratic forms
- To learn the methods of solving first order differential equations and learn about its applications to basic engineering problems
- To learn the methods of solving higher order differential equations and learn about its applications to basic engineering problems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Find the rank of a matrix and to analyze the solution of system of linear equations
CO-2: Calculate Eigen values and Eigen vectors
CO-3: Reduce the quadratic form to canonical form
CO-4: Formulate and solve the problems of first and higher order differential equations
CO-5: Apply knowledge of differential equations to real world problems

UNIT-I:
Linear Algebra-Matrices: Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; Consistency of Homogeneous and Non-Homogeneous equations, Gauss Jacobi and Seidel Iteration Method.

UNIT-II:
Linear Algebra-Eigen Values and Eigen Vectors: Eigen values and eigenvectors and their properties, Diagonalization of matrices; Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem

UNIT-III:
Real & Complex Matrices, Quadratic Forms: Types of Matrices, Symmetric; Hermitian; Skew-Symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices and its properties; Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms using Linear Transformation and Orthogonal Transformations.

UNIT-IV:
First Order and First Degree ODE: Differential equations of first order and first degree - Exact differential equation, Linear and Bernoulli differential equation , Applications of differential equations of first order and first degree - Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories.

UNIT-V:
Higher Order ODE with Constants Coefficients: Second order linear differential equations with constant coefficients: Solution of Homogenous non homogeneous differential equations, Non-Homogeneous terms of the type e , sin (ax), cos (ax), polynomials in x, e V(x), x V(x).

UNIT-VI:
Ordinary Differential Equations with Variable Coefficients: Method of variation of parameters; Equations reducible to linear ODE with constant Coefficients: Legendre's equation, Cauchy-Euler equation. Series solutions of second order Ordinary Differential Equations, Singular point, Regular singular point, Frobineous Method.

TEXT BOOKS:
1. Linear Algebra: A Modern Introduction, D. Poole, 2nd Edition, Brooks/Cole, 2005
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley, 2006
3. Higher Engineering Mathematics, B. V. Ramana, 11th Reprint, Tata McGraw-Hill, New Delhi, 2010

REFERENCES:
1. Higher Engineering Mathematics, B. S. Grewal, 36th Edition, Khanna Publishers, 2010
2. Differential Equations, S. L. Ross, 3rd Edition, Wiley India,1984
3. Advanced Engineering Mathematics, Peter 'O' Neil, Cengage Learning
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa Publications

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester– Common to all branches	L	T/P/D	C
	3	1	4

(18BS1CH01) ENGINEERING CHEMISTRY

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To list out the importance of polymers, surfactants and lubricants in real world scenario
- To outline the features of conventional and non-conventional sources of energy
- To discuss the problems of corrosion on structures to interpret the need of alloys and describe the thermodynamic equilibrium of a system using phase rule
- To emphasize the importance of nanomaterials, analytical techniques, environmental and green chemistry

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify & recognize the role of polymers, surfactants and lubricants in various fields
CO-2: Rationalize ideas about alternate sources of energy so as to reduce load on fossil fuels
CO-3: Summarise the effects of corrosion to indicate the use of alloys and predict the behaviour of a system under different variables
CO-4: Familiarize with the role of nanomaterials, environmental & green chemistry and assess the use of analytical techniques

UNIT-I:
Polymers: Definition, types of polymerization-addition, condensation and copolymerization, Properties of polymers- crystallinity, melting point and glass transition, viscoelasticity, solubility of polymers. Fabrication of polymers (compression, extrusion, blowing and thermoforming). Synthesis, properties and uses of PET, PTFE, PMMA, polycarbonate, Bakelite and urea formaldehyde. Conducting polymers-definition, classification and applications, Dendrimers-definition, features, applications. FRPs and their applications.

UNIT-II:
Surfactants: Types of surfactants, cleaning mechanism, hydrophobic and hydrophilic interactions, micelles, reverse micelles and critical micelle concentration. Detergents and their role as cleaning agents.
Lubricants: Definition, types, mechanism of lubrication-thick film lubrication, thin film lubrication and extreme pressure lubrication. Additives and selection of lubricants. Properties-viscosity, cloud and pour point, flash and fire point, saponification number-definition and significance.

UNIT-III: Energy Science
Fuels: Definition, classification, characteristics of a good fuel. Coal-proximate & ultimate analysis-significance. Petroleum- refining, knocking, octane number, cetane number.

Cracking-definition, types of cracking, fluid-bed cracking. Limitations of fossil fuels. Alternative and non-conventional sources of energy – solar, wind, geothermal, nuclear and biomass (advantages and disadvantages).

Battery Technology: Features of batteries, Rechargeable batteries- lithium ion and Zn-air batteries. Fuel cells-methanol-oxygen fuel cell, Solar cells- principle and applications.

UNIT-IV:
Alloys: Purpose of making alloys, classification of alloys, ferrous alloys ex: Steel, non-ferrous alloys ex: Cu, Al, Pb (features and applications).

Phase rule, definition of terms in phase rule, advantages and limitations of phase rule, simple phase diagram -water system.

Corrosion: Introduction, causes and effects of corrosion, chemical and electrochemical corrosion and mechanism of corrosion. Types-differential aeration corrosion (Pitting and waterline corrosion), differential metal corrosion (Galvanic corrosion). Factors affecting corrosion-nature of metal (position, passivity, purity, areas of anode and cathode) & nature of environment (temperature, pH, humidity). Corrosion control methods-proper designing, cathodic protection, differences between galvanizing and tinning, paints-constituents and functions.

UNIT-V:
Nanomaterials: Definition, synthesis-top down and bottom up approaches. Properties and application of fullerenes, fullerols and carbon nanotubes. Applications of nanomaterials in electronics, catalysis, telecommunication and medicine.

Analytical Techniques: Working principle and applications of pH-metry, conductometry, colorimetry, chromatography (TLC), Scanning tunneling microscope and atomic force microscope. Sensors: Lab-on-a-chip- features and applications.

UNIT-VI:
Environmental: Air, water and noise pollution: sources and effects, optimum levels of pollution. Solid waste management and e-waste: effects and management.

Green Chemistry- Definition, principles and applications of green chemistry. Self-healing materials-principle and applications.

TEXT BOOKS:
1. Engineering Chemistry, P. C. Jain and M. Jain, 16th Edition, Dhanpat Rai Publications, New Delhi
2. Engineering Chemistry, Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy, Subhendu Chakraborty, Cengage Publications, Delhi, 2018
3. A Textbook of Engineering Chemistry, Shashi Chawla, Dhanpat Rai Publications, New Delhi

REFERENCES:
1. Engineering Chemistry, S. S. Dara, S. Chand & Company Ltd., New Delhi
2. Engineering Chemistry, O. G. Palanna, Tata McGraw-Hill Education Pvt. Ltd., New Delhi
3. Engineering Chemistry, B. Sivasankar, Tata McGraw-Hill Education Pvt. Ltd., New Delhi
4. Introduction to Nanoscience, S. M. Lindsay
5. Introduction to Environmental Science, Y. Anjaneyulu, BS Publications, Hyderabad

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester – Common to all branches

L	T/P/D	C
2	0	2

(18HS1EN01) ENGLISH

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To enhance their vocabulary through the use of affixes/stem and learn technical vocabulary in specialist fields
- To read and comprehend different kinds of texts (tone, tenor, sound, sense, diction, etc.- sub-skills)
- To write clear, concise, and correct sentences and paragraphs to produce appropriate technical prose
- To recognize and practice use the rhetorical elements necessary for the successful practice of scientific and technical communication

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Use vocabulary effectively and contextually
CO-2: Employ reading skills to comprehend different kinds of texts. (tone, tenor, sound, sense, diction, etc.- sub-skills)
CO-3: Apply principles of critical thinking, problem solving, for clarity, conciseness and accuracy of expression in academic and professional communication
CO-4: Demonstrate improved competence in Standard Written English, including grammar, sentence and paragraph structure, coherence, and use this knowledge to accurately communicate technical information.
CO-5: Employ the appropriate rhetorical patterns of discourse in technical and business contexts for scientific and technical communication

UNIT-I:
1. Reading: On the Conduct of Life by William Hazlitt
2. Speaking & Listening: Pronunciation, Stress, Intonation and Rhythm
3. Grammar: Prepositions
4. Vocabulary: Word Formation- I
5. Writing: Punctuation, Clauses and Sentences
6. Life Skills: Values and Ethics; 'If' by Rudyard Kipling

UNIT-II:
1. Reading: The Brook by Alfred Tennyson
2. Speaking & Listening: Introducing oneself and others, making announcements
3. Grammar: Articles
4. Vocabulary: Word Formation- II
5. Writing: Principles of Good Writing-Coherence, Cohesion
6. Life Skills: Self Improvement; How I Became a Public Speaker by G.B. Shaw

UNIT-III:
1. Reading: The Death Trap by Saki
2. Speaking & Listening: Gaining attention, Interrupting Conversations

3. Grammar:	Noun-Pronoun Agreement; Subject-Verb Agreement
4. Vocabulary:	Word Formation- III
5. Writing:	Transitional Devices & Paragraph Writing; Writing Process
6. Life Skills:	Time Management; On Saving Time by Seneca

UNIT-IV:
1. Reading:	Chindu Yellamma
2. Speaking & Listening:	Making Requests and Responding to them; Extended Listening
3. Grammar:	Misplaced Modifiers
4. Vocabulary:	Synonyms and Antonyms
5. Writing:	Writing a Summary
6. Life Skills:	Innovation; Muhammad Yunus

UNIT-V:
1. Reading:	Politics and the English Language by George Orwell
2. Speaking & Listening:	Interview Skills; Making a Presentation
3. Grammar:	Cliches; Redundancies
4. Vocabulary:	Common Abbreviations
5. Writing:	Cause and Effect Paragraphs
6. Life Skills:	Motivation; The Dancer with a White Parasol by Ranjana Dave

UNIT-VI:
Organizational Patterns for writing
1. Patterns of Writing:	Comparison and Contrast
2. Patterns of Writing :	Classification Paragraph
3. Patterns of Writing:	Problem-Solution Pattern of writing

TEXT BOOK:
1. Language and Life : A Skills Approach, Orient Black Swan

RECOMMENDED BOOKS:
1. Technical Communication, Meenakshi Raman & Sangeeta Sharma, Oxford University Press
2. Effective Communication Skills, Kulbushan Kumar, Khanna Publishing House, Delhi
3. Communication Skills, Pushplata, Sanjay Kumar, Oxford University Press
4. Longman Dictionary of Common Errors, N.D. Turton and J.B. Heaton

SUGGESTED READINGS:
1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006
5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
6. Rhetorical Grammar: Grammatical Choices, Rhetorical Effects (7th ed.), Martha Kolln & Loretta Gray. New York: Longman, 2012. ISBN-10: 0321846729; ISBN-13: 978-0321846723

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester– Common to all branches

L	T/P/D	C
3	0	3

(18ES1CS01) PROGRAMMING THROUGH C

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To relate basics of programming language constructs and problem solving techniques
- To classify and implement derived data types
- To analyze and develop effective modular programming
- To construct mathematical problems and real time applications using C language

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understand the computer fundamentals and basics of C programming for problem solving and represent the same by algorithm, flowchart, and pseudocode.

CO2: Apply and write C programs using C language construct basic and derived data types.

CO3: Classify different searching and sorting techniques, and able to use preprocessor directives

CO4: Develop a solution for a given problem using modular approach, file I/O

UNIT-I:

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flow chart / Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, syntax and logical errors in compilation, object and executable code .Arithmetic expressions and precedence

UNIT-II:

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching Iteration and loops
Arrays (1-D, 2-D), Character arrays and Strings

UNIT-III:

Basic Algorithms: Searching, basic sorting algorithms (bubble, insertion and selection), finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT-IV:

Functions: (Including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.

Recursion: Recursion, as a different way of solving programs. Example programs, such as finding factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-V:
Structures: Defining structures and array of structures.
Pointers: idea of pointers, defining pointers, use of pointers in self-referential structures, notation of linked list (no implementation), dynamic memory allocation.

UNIT-VI:
File Handling: Basic concepts, text files and binary files, file input/output operations, random access of files, command line arguments.

TEXT BOOKS:
1. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill
2. Programming in ANSI C, E. Balaguruswamy, Tata McGraw-Hill

REFERENCES:
1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester – Common to all branches   L   T/P/D   C
                                                          0   3   1.5

(18BS2CH01) ENGINEERING CHEMISTRY LABORATORY

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To practically learn the preparation of standard solutions and estimate hardness & chloride content so as to check its suitability for various purposes
- To determine the rate constant of a reaction and check the variation of concentrations with respect to time
- To measure properties like adsorption, absorption of light, conductance, viscosity, pH and surface tension
- To synthesize a polymer and to separate a mixture of organic compounds by Thin Layer Chromatographic (TLC) technique

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: To record the amount of hardness and chloride content in water and interpret the significance of its presence in water
CO-2: To analyze the influence of variation of concentration with time on rate constant
CO-3: To report and predict the significance of properties like absorption of light, adsorption, conductance, viscosity, pH and surface tension
CO-4: To demonstrate the technique of Thin Layer Chromatographic (TLC) and preparation of a polymer

LIST OF EXPERIMENTS:

1. Estimation of hardness of water by complexometric method using EDTA.
2. Determination of chloride content in the given sample water using Argentometric method.
3. Determination of the rate constant of hydrolysis of ester.
4. Verification of Freundlich/Langmuir isotherm for adsorption of acetic acid on charcoal.
5. Estimation of copper present in the given solution by colorimetric method.
6. Conductometric titration of Acid vs Base.
7. Determination of viscosity of sample oil by Redwood Viscometer-I.
8. Determination of pH of various sample solutions by pH meter.
9. Determination of R_f value of organic compounds in a mixture by Thin Layer Chromatography.
10. Determination of surface tension of a liquid by drop method using Stalagmometer.
11. Titration of Acid vs Base using pH metric method.
12. Synthesis of a Polymer-Bakelite/Nylon.

TEXT BOOKS:
1. Laboratory Manual on Engineering Chemistry, S. K. Bhasin and Sudha Rani, Dhanpat Rai Publications

2. College Practical Chemistry, V. K. Ahluwalia, Sunitha Dhingra, Adargh Gulati, University Press Pvt. Ltd.
3. Practical Chemistry, Dr. O. P. Pandey, D. N. Bajpai, and Dr. S. Giri, S. Chand Publications

REFERENCES:
1. Vogel's Textbook of Quantitative Chemical Analysis, G. N. Jeffery, J. Bassett, J. Mendham and R. C. Denny, Longmann, ELBS
2. Advanced Practical Physical Chemistry, J. D. Yadav, Goel Publishing House
3. Practical Physical Chemistry, B. D. Khosla, R. Chand and Sons

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester – Common to all branches	L	T/P/D	C
	0	2	1

(18HS2EN01) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To provide ample practice in LSRW skills and train the students in oral presentations, public speaking, role play and situational dialogue
- To provide practice in vocabulary usage, grammatical construction, structural patterns, and improve comprehension abilities in the students
- To train students to use neutral accent through phonetic sounds, symbols, stress and intonation
- To enable students to transfer information from verbal to graphic representation and vice versa
- To equip the learners to learn basic vocabulary of 3000 words. (as identified in Oxford or Cambridge dictionary)

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Comprehend spoken and written discourse
CO-2: Speak fluently with neutral accent and exhibit interpersonal skills
CO-3: Write accurately, coherently and lucidly making appropriate use of words depending on context
CO-4: Introduce oneself to people and be able to speak extempore
CO-5: Should have learnt the basic vocabulary of 3000 words (as identified by oxford/Cambridge advanced learners dictionary)

UNIT-I:
1. Introduction of Self and others
2. Listening Comprehension-Listening for details
3. Reading Skills- Skimming and Scanning

UNIT-II:
1. Role play
    i)   Expressing likes and dislikes;
    ii)   Agreeing and disagreeing
    iii)   Making requests (Using modals for polite requests)
    iv)   Accepting and declining requests
2. Listening and note taking
3. Reading Skills - Intensive Reading and Extensive Reading

UNIT-III:
1. Extempore Speech : JAM
2. Accuracy in listening- listening to discussion on specific issues
3. Pronunciation, Intonation, Stress and Rhythm

UNIT-IV:
1. Speaking Activity: Oral Presentation

2. Accuracy in listening- listening to discussion on specific issues
3. Reading Comprehension

UNIT-V:
1. Speaking Activity: Book/Film Review
2. Reading Comprehension-Contextual Vocabulary
3. Passive Voice-Constructing the impersonal passive

UNIT-VI:
1. Writing Skills: Information Transfer
2. Definition of a Technical Term
3. Description of a Mechanism/Process

SUGGESTED READINGS:
1. Practical English Usage, Michael Swan, OUP, 1995
2. Remedial English Grammar, F. T. Wood, Macmillan, 2007
3. Exercises in Spoken English, Parts I-III, CIEFL, Hyderabad. Oxford University Press
4. Cambridge or Oxford Dictionary
5. Fowler's Modern English Usage, Revised, R. W. Burchfield

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester– Common to all branches

L	T/P/D	C
0	4	2

(18ES2CS01) PROGRAMMING THROUGH C LABORATORY

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To gain a working knowledge of C programming to write modular, efficient and readable C programs by Identifying the structural elements and layout of C source code
- To declare and manipulate single and multi-dimensional arrays of the C   data types and derived data types like structures, unions
- To use functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions
- To manipulate character strings in C programs. Utilize pointers to efficiently solve problems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO1: Use the fundamental process of problem solving using any programming environment.
CO2: Design and develop the efficient solution for a given problem using different basic and derived data types.
CO3: Solve the given problem using C language constructs, modules, file I/O
CO4: Choose the data type, language construct for a given problem, design and record the solution using algorithm, flowchart.

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment.

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures.

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.t., sum of series.

Tutorial 5: 1D arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and strings
Lab 6: Matrix problems, string operations.

Tutorial 7: Functions, call by value:

Lab 7: Simple functions.

Tutorial 8 and 9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls.
Lab 10: Recursive functions.

Tutorial 11: Pointers, structures and dynamic memory allocation.
Lab 11: Pointers and structures

Tutorial 12: File handling
Lab 12: File operations.

B.Tech. II Semester – Common to all branches	**L**	**T/P/D**	**C**
	1	**3**	**2.5**

(18ES2ME01) WORKSHOP PRACTICES

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To know the different popular manufacturing process
- To gain a good basic working knowledge required for the production of various engineering products
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field
- To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Exposure to Various types of manufacturing Process

CO-2: Fabricate/make components from wood, MS flat, GI Sheet etc. – hands on experience

CO-3: Exposure to manufacturing of machine components like fasteners, holes & threaded holes etc.

CO-4: Produce small devices / products /appliances by assembling different components

LECTURES & VIDEOS:

1. Manufacturing Methods - Casting, Forming, Machining, Joining, Advanced Manufacturing Methods
2. CNC Machining, Additive Manufacturing
3. Fitting Operations & Power Tools
4. Electrical & Electronics
5. Carpentry
6. Plastic Moulding, Glass Cutting
7. Metal Casting
8. Welding (Arc Welding & Gas Welding), Brazing
9. Power Tools
10. Printed Circuit Boards

TRADES:
I. Carpentry
   i.   Cross lap joint
   ii. Mortise & tenon joint

II. Fitting
   i.   Square fitting
   ii. L-Fitting

III. Welding
    i.   Butt joint by arc welding
    ii.   Lap joint by arc welding

IV. Smithy
    i.   Making of Rectangular Tray from sheet metal.
    ii.   Making of U shaped component by black smithy

V. Electrical & Electronics
    i.   Single lamp connection & Stair case connection
    ii.   Translation of any tested / designed and tested circuits on a PCB.

VI. Machine Shop
    i.   Step turning on lathe
    ii.   Drilling & threading

TEXT BOOKS:
1. Workshop Manual, P. Kannaiah and K. L. Narayana, Scitech
2. Elements of Workshop Technology, Vol. I and Vol. II, Hajra Choudhury S. K., Hajra Choudhury A. K. and Nirjhar Roy S. K., Media Promoters and Publishers Private Limited, Mumbai, 2008 and 2010
3. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, McGraw-Hill

REFERENCES:
1. Manufacturing Engineering and Technology, Kalpakjian S. and Steven S. Schmid, 4th Edition, Pearson Education India Edition, 2002
2. Manufacturing Technology – I, Gowri P. Hariharan and A. Suresh Babu, Pearson Education, 2008
3. Processes and Materials of Manufacture, Roy A. Lindberg, 4th Edition, Prentice Hall India, 1998
4. Manufacturing Technology, Vol. I and Vol. II, Rao P.N., Tata McGraw-Hill House, 2017

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester - CSE, IT	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18BS1MT07) PROBABILITY, STATISTICS AND QUEUING THEORY

COURSE PRE-REQUISITES: Permutations and Combinations, Basic statistics

COURSE OBJECTIVES:
- To elementary ideas in basic probability
- To different types of probability distribution functions
- To methods of calculating correlation and regression
- To various methods to test the hypothesis
- To concepts of queuing theory

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Solve problems involving basic probability
CO-2: Evaluate statistical parameters of different probability distributions
CO-3: Calculate correlation, regression, rank correlation coefficients
CO-4: Apply the knowledge of different probability distributions to test a hypotheses
CO-5: Apply the knowledge of different probability distributions to solve problems in queuing theory

UNIT-I:
Basic Probability: Sample space and events, Probability- The axioms of probability, some elementary theorems, conditional probability, Baye's theorem. Random variables - discrete and continuous distributions - Expectation of Discrete Random Variables, Moments, Variance of a sum.

UNIT-II:
Probability Distributions: Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions –related properties.

UNIT-III:
Correlation and Regression: Coefficient of correlation, regression coefficient, the lines of regression, rank correlation

UNIT-IV:
Testing of Hypothesis - Large Sample: Tests of hypothesis - null hypothesis, alternate hypothesis, type I, type II errors, critical region. Inferences concerning means and proportions. Test of hypothesis for single mean and difference between the means. Test of hypothesis for the proportions- single and difference between the proportions, confidence interval for the mean and proportions for large samples.

UNIT-V:
Tests of Significance - Small Samples: Tests of significance, t-distribution, F-distribution, Chi square distribution and their confidence intervals.

UNIT-VI:

Queuing Theory: Queuing theory -Arrival process and Service process- Pure birth and Death process, M/M/1 model with finite and infinite capacities, M/M/C model with infinite capacity.

TEXT BOOKS:

1. Probability and Statistics for Engineers, Richard A. Johanson, 5thEdition, Prentice-Hall, 1995,
2. Probability and Statistics for Engineering & Sciences, Jay L. Devore, 8th Edition, Cengage learning
3. The Single Server Queue, J. W. Cohen, Wiley Interscience, New York, NY, 1969,

REFERENCES:

1. A Textbook of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2010
2. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 35th Edition, 2000
3. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006
4. An Introduction to Statistical Learning with Applications in R, Gareth James, Daniela Written, Trevor Hastic, Robert Tibshirani,

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester - CSE, IT	L	T/P/D	C
	3	0	3

(18ES1CS02) DIGITAL LOGIC DESIGN

COURSE OBJECTIVES:
- **To analyze** and explore uses of logic functions for building digital logic circuits
- **To explore** the combinational logic circuits
- **To examine** the operation of sequential (synchronous and asynchronous) circuits
- **To understand** the programming concepts of HDL for simulating any type of logic circuits

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Simplify the complex logic functions using k-maps and tabulation methods
CO-2: Build any type of combinational circuits that help in further designing memory elements
CO-3: Design Synchronous and Asynchronous sequential circuits using memory elements
CO-4: Apply the concepts of HDL for simulating the logic functions, combinational and sequential circuits

UNIT-I:
Numbers Systems and Codes: Review of number systems, number base conversion, binary arithmetic, binary weighted and non-weighted codes, Complements, Signed binary numbers, Error Detection and Correcting Codes, Binary Logic.

UNIT-II:
Boolean Algebra and Gate Level Minimization: Postulates and theorems, representation of switching functions, SOP and POS forms –Canonical forms, digital logic gates, Karnaugh Maps –minimization using three variable, four variable and five variable K-Maps, Don't Care Conditions, NAND and NOR implementation , Other Two-Level Implementation, Exclusive-OR function, Integrated Circuits, Hardware Description Language(HDL).

UNIT-III:
Design of Combinational Circuits: Combinational Circuits- Analysis and Design Procedure, Binary adder and subtractors, Binary multiplier, magnitude comparator, BCD adder, Decoders, Encoders, Multiplexers, Demultiplexers, HDL for Combinational Circuits.

UNIT-IV:
Design of Sequential Circuits: Combinational Vs Sequential Circuits, Latches, Flip Flops-RS flip flop, JK flip flop, T flip flop, D flip flop, Master-Slave Flip flop- Flip Flops excitation functions, Conversion of one flip flop to another flip flop, Asynchronous Vs Synchronous circuits, Analysis of clocked sequential circuits, State Table, State Diagram, State Reduction and State Assignment, Mealy and Moore Machines, HDL for Sequential circuits.

UNIT-V:

Counters and Registers: Design of synchronous counters, Ripple Counters, Asynchronous counters, Registers, Shift Registers, HDL for counters and registers.
Memory: Random Access Memory, Read Only Memory, Programmable Logic Array, Programmable Array Logic.

UNIT-VI:

Asynchronous Sequential Logic: Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and flow Tables, Race Free State Assignment, Hazards, Design examples.

TEXT BOOKS:

1. Digital Design, Third Edition, M. Morris Mano, Pearson Education/PHI
2. Switching and Finite Automata Theory by Zvi Kohavi, Tata McGraw-Hill

REFERENCES:

1. Fundamentals of Logic Design, Roth, 5th Edition, Thomson
2. Switching and Logic Design, C. V. S. Rao, Pearson Education
3. Digital Principles and Design Donald D. Givone, Tata McGraw-Hill, Edition
4. Fundamentals of Digital Logic & Micro Computer Design, 5th Edition, M. Rafiquzzaman, John Wiley

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1IT01) DATA STRUCTURES
(Common to CSE, ECE and IT)

COURSE OBJECTIVES:
- To impart the basic concepts of data structures and algorithms
- To introduce various searching and sorting techniques
- To demonstrate operations of linear and non-linear data structure
- To develop an application using suitable data structure

COURSE OUTCOMES: After completion of the course, the student should be able to
CO1: Understand basic concepts of data structures, computation complexity
CO2: Classify various sorting, searching techniques with complexities
CO3: Demonstrate various operations of linear and non-linear data structures.
CO4: Identify appropriate and efficient data structure to implement a given problem

UNIT-I:
Introduction to Data Structures: Abstract Data Types (ADT), Asymptotic Notations. Time- Space trade off. Searching: Linear Search and Binary Search Techniques and their time complexities.
Linear Data Structures: Stacks - ADT Stack and its operations: Applications of Stacks: Recursion, Expression Conversion and evaluation.

UNIT-II:
Linear Data Structures: Queues - ADT queue, Types of Queue: Linear Queue, Circular Queue, Dequeue: Operations on each types of Queues

UNIT–III:
Linked Lists: Singly linked lists: Representation in memory, Operations: Traversing, Searching, insertion, Deletion from linked list; Linked representation of Stack and Queue.
Doubly linked List, Circular Linked Lists: All operations

UNIT–IV:
Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search Tree, AVL Tree; Tree Operations on each of the trees and their algorithms with time complexities.
B-Trees: Definition, Operations.

UNIT–V:
Priority Queue: Definition, Operations and their time complexities.
Sorting: Objective and properties of different sorting algorithms: Heap Sort, Merge Sort; Radix sort

UNIT–VI:
Dictionaries- Definition, ADT, Linear List representation, operations- insertion, deletion and searching, Hash Table representation, Hash function-Division Method, Collision

Resolution Techniques-Separate Chaining, open addressing-linear probing, quadratic probing, double hashing, Rehashing.

Graphs: Graph terminology –Representation of graphs –Graph Traversal: BFS (breadth first search) –DFS (depth first search) –Minimum Spanning Tree.

TEXT BOOKS:
1. Fundamental of Data Structure, Horowitz and Sahani, Galgotia Publication
2. Data Structure, Lipschutz, Schaum Series

REFERENCES:
1. Algorithms, Data Structures, and Problem Solving with C++, Mark Allen Weiss, Illustrated Edition, Addison-Wesley Publishing Company
2. How to Solve it by Computer, R. G. Dromey, 2ndImpression, Pearson Education

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester - CSE, IT	L	T/P/D	C
	3	0	3

(18PC1CS01) MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE

COURSE OBJECTIVES:
Throughout the course, Students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:
- To apply logical reasoning to a variety of problems
- To understand the concepts on elementary combinatorics and permutations
- To analyze the properties of graphs and trees
- To evaluate various methods for solving the recurrence relations

COURSE OUTCOMES: After completion of the course, the student should be able to
CO1: Analyze the theory and techniques of mathematical logic, graphs
CO2: Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.
CO3: Illustrate the basic applications of set theory and relations.
CO4: Define the various methods for solving recurrence relations

UNIT-I:
Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.
Predicates: Quantifiers, Predicative logic, Free & Bound variables.

UNIT-II:
Set Theory: notations, inclusion and equality sets, operations on sets, Venn diagrams.
Relations: Properties of binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Hasse diagram.
Functions: Types of Functions, Inverse Function, Composition of functions, recursive Functions.

UNIT-III:
Elementary Combinatorics: Basics of counting, Combinations & Permutations, with repetitions, Constrained repetitions, the principles of Inclusion – Exclusion, Pigeon hole principle.

UNIT-IV:
Graphs: Graphs and their Properties, Degree, Connectivity, Path, Cycle, Sub graph, Isomorphism, Eulerian and Hamiltonian Walks, Planar Graphs, Graph coloring, Chromatic Numbers.

UNIT-V:
Trees: Properties of trees – Distance and centers in tree – Rooted and binary trees. Spanning trees, BFS, DFS, Spanning trees in a weighted graph.

UNIT-VI:

Recurrence Relations: Generating Functions, Function of Sequences, Calculating Coefficients of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, solution of Inhomogeneous Recurrence Relations.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Trembly and R. Manohar, TMG Edition, Tata McGraw-Hill
2. Discrete Mathematics for Computer Scientists & Mathematicians, J. L. Mott, A. Kandel, T. P. Baker, 2nd Edition, PHI
3. Graph Theory: With Application to Engineering and Computer Science, Narsingh Deo, Prentice Hall of India, 2003

REFERENCES:

1. Elements of Discrete Mathematics - A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw-Hill
2. Discrete Mathematics and its Applications, Kenneth H. Rosen, Tata McGraw-Hill
3. Discrete Mathematics, Norman L. Biggs, 2nd Edition, Oxford University Press

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester - CSE, IT

	L	T/P/D	C
	3	0	3

(18PC1CS02) OBJECT ORIENTED PROGRAMMING THROUGH C++

COURSE OBJECTIVES:
- Understand the basics of OOPs and features of C++ supporting object oriented programming
- Understand the dynamic allocation of objects and concept of friend
- Demonstrate the advanced object oriented programming features like inheritance polymorphism etc.
- Understand the usage of exception handling, File I/O, Standard template library

COURSE OUTCOMES: After completion of the course, the student should be able to
CO1: Relate the basic concepts of oops to solve real problems
CO2: Demonstrate the creation of objects and access specifiers
CO3: Classify the advanced OOPs features like inheritance polymorphism etc. in developing the solution for a given problem
CO4: Demonstrate exception handling, Streams, STL in formulating the solution for a given problem

UNIT-I:
Programming paradigms – Object-Oriented Paradigm: Elements of Object Oriented Programming, benefits of object oriented programming. Moving from C to C++. Classes and Objects-Class specification, definition, inline functions, Access specifiers, Passing and returning objects – Array of objects - Static members. Example programs

UNIT-II:
Constructors - Parameterized constructors - Constructor overloading. Copy constructor, Destructors, Default arguments –dynamic memory allocation- new, delete operators - "this" pointer, friend classes and friend functions. Example programs

UNIT-III:
Function overloading – Operator overloading- unary operator overloading- binary operator overloading-, operator overloading with friend function, Generic programming with templates-Function templates, class templates. Example programs

UNIT-IV:
Inheritance-Base class and derived class relationship-derived class declaration-Forms of inheritance- inheritance and member accessibility- constructors in derived class, abstract class, virtual functions, and pure virtual function.

UNIT-V:
Exception Handling- Introduction, Principles Of Exception Handling, The Keywords Try, Throw and Catch, Exception Handling Mechanism, Multiple Catch Statements, list of exceptions, catch All exceptions, Standard Template Libraries – Containers , Iterators, Functions

UNIT-VI:
Files and Streams-Opening and Closing a file- file modes- file pointers and their manipulation, sequential access to a file-random access to a file-Reading and Writing.

TEXT BOOKS:
1. Mastering C ++, Venugopal, Rajkumar, Ravi Kumar, TMH
2. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley, 3rd Edition, 2008

REFERENCES:
1. The Complete Reference, C++, 4th Ed., Herbert Schildt, TMH

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1IT02) COMPUTER ORGANIZATION
(Common to CSE, EIE and IT)

COURSE OBJECTIVES:
- To describe the functional blocks of a computer to interpret the instructions and various addressing modes for the execution of instruction cycle
- To perform Arithmetic micro operations on integers and floating-point numbers
- To analyze the cost performance and design trade-offs in designing and constructing a computer processor including memory
- To discuss the different ways of communicating with I/O devices & interfaces and the design techniques to enhance the performance using pipelining, parallelism

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Interpret the functional architecture of computing systems
CO-2: Explore memory, control and I/O functions
CO-3: Impart the knowledge on microprogramming
CO-4: Analyze instruction level parallelism, Concepts of advanced pipeline techniques

UNIT – I:
Functional Blocks of a Computer: CPU, memory, input-output subsystem, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
Case study – Instruction set of some common CPUs

UNIT – II:
Data Representation: Signed number representation, fixed and floating point representations, character representation.
Computer Arithmetic: **Integer Addition** and **Subtraction** - Ripple carry adder, carry look-ahead adder. **Multiplication** – Shift-and add, Booth multiplier, carry save multiplier. **Division** – Restoring and non-restoring techniques, floating point arithmetic.

UNIT – III:
Microprogrammed Control: Control memory, address sequencing, micro program example, and design of control unit, hardwired control, and micro programmed control.

UNIT – IV:
Memory System Design: Semiconductor memory technologies. SRAM vs DRAM.
Memory Organization: Memory interleaving, concepts of hierarchical memory organization, cache memory, cache size vs block size, mapping functions, replacement algorithms, write policies, virtual memory, secondary storage.

UNIT – V:
Peripheral Devices and their Characteristics: Input-output subsystems, I/O device interface, I/O transfers, - program controlled, Interrupt driven and DMA, privileged and non –privileged instructions, software interrupts and exceptions. Programs and

processes – role of interrupts in process state transitions, I/O device interfaces – SCSI, USB.

UNIT – VI:
Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction pipe line, RISC pipeline Vector Processing, Array Processors

TEXT BOOKS:
1. Computer Organization and Design: The Hardware/Software Interfaces, 5th Edition by David A. Patterson and John L. Hennessy, Elsevier
2. Computer Organization and Embedded Systems, 6th Edition by Carl Hamacher, McGraw Hill Higher Education

REFERENCES:
1. Computer System Architecture, M. Morris Mano, 3rd Edition
2. Computer Architecture and Organization, 3rd Edition by John P. Hayes, WCB/McGraw-Hill
3. Computer Organization and Architecture: Designing for Performance, 10th Edition by William Stallings, Pearson Education
4. Computer System Design and Architecture, Vincent P. Heuring and Harry F. Jordan, 2nd Edition, Pearson Education

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

	L	T/P/D	C
	0	3	1.5

(18PC2IT01) DATA STRUCTURES LABORATORY
(Common to ECE, CSE and IT)

COURSE OBJECTIVES:
- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting
- To understand the basic concepts about stacks, queues, lists
- To understand the concepts of trees and graphs

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate all operations on different linear data structures
CO-2: Develop all operations on different non-linear data structures
Co-3: implement various searching and sorting techniques
Co-4: apply appropriate data structure for any given problem

WEEK 1
a) Implement Stack using Array

WEEK 2
a) Program to convert infix expression to postfix expression.
b) Program to Postfix evaluation.

WEEK 3
Implement the following
a)   Linear Queue using Array   b) Circular Queue using Array

WEEK 4
Implement Dequeue using Array

WEEK 5
Implement Single Linked List operations

WEEK 6
Implement following
a) Circular Linked List Operations   b) Double Linked List Operations

WEEK 7
Implement following
b) Stack using Linked List   c) Queue using Linked List

WEEK 8
Implement BST operations

WEEK 9
Implement B Tree operations -

WEEK 10
Implement following sorting techniques
a)   Merge   b) Heap c) Radix

WEEK 11
Implement following Hashing Techniques
a) Separate Chaining   b) Linear Probing

WEEK 12
Implement following Graph traversals
a)   BFS   b) DFS

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester - CSE, IT	L	T/P/D	C
	0	3	1.5

(18PC2CS01) OBJECT ORIENTED PROGRAMMING THROUGH C++ LABORATORY

COURSE OBJECTIVES:
- To identify and practice the basic concepts of object-oriented programming
- To analyse the exception handling mechanism and dynamic allocation of objects
- To familiarize students with advanced concepts of object-oriented programming in C++
- To facilitate students with the skills required to solve problems using object oriented concepts

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Develop C++ programs for simple applications that make use of classes and objects

CO-2: Implement programs using C++ features such as Polymorphism, inheritance, templates etc.

CO-3: Choose various STL libraries and exceptional handling for solving real world problems

CO-4: Experiment with storage management concepts

WEEK 1
Moving towards C to C++ -- Sample programs using C++, Sample programs using classes

WEEK 2
Programs on Parameter passing methods, Inline functions, Static members, Access specifiers

WEEK 3
Programs on default arguments, constructors, Constructor overloading, destructors, 'this' pointers

WEEK 4
Programs on Dynamic memory allocation, friend functions and classes

WEEK 5
Programs on function overloading, Operator Overloading

WEEK 6
Programs on function and class templates

WEEK 7
Programs on Inheritance- Different forms of inheritance

WEEK 8
Programs using abstract classes, polymorphism

WEEK 9
Sample Programs on Exception handling – Basic constructs
Programs on multiple catch statement, Exceptions in Constructors and destructors

WEEK 10
Programs using STL

WEEK 11
Programs on different operations on files

WEEK 12
Programs on random access to files

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

L	T/P/D	C
0	2	0

(18MN6HS02) ENVIRONMENTAL SCIENCE

COURSE PRE-REQUISITES: Basic knowledge of environmental issues

COURSE DESCRIPTION:
Environmental science is the study of patterns and processes in the natural world and their modification by human activity. We as human beings are not an entity, separate from the environment around us, rather we are a constituent seamlessly integrated and co-exist with the environment around us. To understand current environmental problems, we need to consider physical, biological and chemical processes that are often the basis of those problems. The course requires the students to identify and analyse natural and human-made environmental problems, evaluate the relative risks associated with these problems, and examine alternative solutions for resolving or preventing them. This course will survey some of the many environmental science topics at an introductory level, ultimately considering the sustainability of human activities on the planet. We are not an entity so separate from the environment that we can think of mastering and controlling it rather we must understand that each and every action of ours reflects on the environment and vice versa.

COURSE OBJECTIVES:
- To recognize the impacts of human interventions towards environment
- To list out the benefits in creating a sustainable environment
- To sketch out various activities in achieving a cleaner environment
- To emphasize the role of an individual for a better planet to live

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Gain a variety of experiences & acquire a basic knowledge about the environment & its allied problems
CO-2: Interpret the key components in safe guarding the environment
CO-3: Appraise the quality of environment in order to create a healthy atmosphere
CO-4: Familiarize with the individual responsibilities towards green revolution

MODULE 1: INTRODUCTION
Environmental Science: Introduction, Definition, scope and importance.

MODULE 2: AWARENESS ACTIVITIES
Small group meetings about:
- Water management
- Projects Vs Environment
- Generation of less waste
- Promotion of recycle use
- Impact of Science & Technology on Environment
- Avoiding electronic waste

MODULE 3: SLOGAN AND POSTER MAKING EVENT
- Food waste management
- Rain water harvesting

- Climate change
- Green Power
- Water conservation
- Green at work
- Role of IT in environment and human health
- Sustainable development

MODULE 4: EXPERT LECTURES ON ENVIRONMENTAL SCIENCE
- Environmental Impact Assessment
- Industrial waste treatment
- Organic farming/Vertical gardens/Hydroponics

MODULE 5: CLEANLINESS DRIVE
- Indoor air pollution
- Vehicular pollution
- VISUAL pollution
- Waste management at home
- Composting
- Plastic recycling

MODULE 6: CASE STUDIES
- HPCL disaster in Vizag
- Oleum gas leak in Delhi
- Mathura Refinery & Taj Mahal
- Conservation of Hussain Sagar lake
- The Cleanliest city of India-Surat
- Green Buildings in India
- KBR park in Hyderabad (Environmental protection Vs Development)
- Fluorosis
- Ecotourism & its impacts

TEXT BOOKS:
1. Environmental Studies for UG Courses, Erach Bharucha, UGC Publications, Delhi, 2004
2. Textbook of Environmental Studies, Deeksha Dave, S. S. Katewa, Cengage Delmar Learning India Pvt., 2012

REFERENCES:
1. Introduction to Environmental Science, Y. Anjaneyulu, BS Publications, 2004
2. Environmental Studies, Anubha Kaushik & C. P. Kaushik, 4th Edition, New Age International

B.Tech. IV Semester   **L   T/P/D   C**
                                                                                       3   0   3
(18HS1MG01) ENGINEERING ECONOMICS AND ACCOUNTANCY
(Common to EIE, CSE and IT)

COURSE OBJECTIVES:
- To explain the basic nature of pure economics and to analyse certain concepts of both Micro & Macro Economics and to know the role of managerial economics in solving problems of business enterprises
- To understand different forms of organizing private-sector and public-sector business enterprises and problems which have been encountered by public enterprises in India
- To describe each stage of product life cycle with the help of different costs and their role in maintaining optimum cost of production and overall profitability by considering different market competitions
- To analyse the process involved in preparation of project proposals, to estimate capital required to commerce and carryon business projects, to know the various sources of mobilizing required amount of capital and to evaluate investment opportunities
- To apply the basic accounting concepts & conventions and to analyse financial position of business enterprise

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Perform decision making function effectively in an uncertain framework by applying the concepts of economics, manage demand efficiently and plan future course of action
CO-2: Select suitable form of business organization which meets the requirements of business
CO-3: Fix the right price which can best meet the pre-determined objectives of the business under different market conditions
CO-4: Identify the best source of mobilising capital, select most profitable investment opportunity, carry out & evaluate benefit/cost, life cycle and Break-even analysis on one or more economic alternatives
CO-5: Analyze overall position of the business enterprise, therefore, take appropriate measures to improve the situation

UNIT-I:
Introduction to Economics & Managerial Economics: Introduction to Economics: Definition, nature, scope and types of Economics. Concepts of Macro-Economics: Gross Domestic Product (GDP), Gross National Product (GNP), National Income (NI) & Rate of Inflation.
Managerial Economics: Definition, nature, scope & significance. Elements of Managerial Economics: Demand Analysis, Law of Demand, Elasticity of Demand and Demand Forecasting.

UNIT-II:
Forms of organizing Private and Public-Sector Business Enterprises: Private Sector Business Enterprises: (i) Sole Proprietorship - Definition, features, merits, limitations & suitability. (ii) Partnership - Definition, Partnership Act, features, types, merits, limitations, suitability. (iii) Joint-Stock Company - Definition, Companies Act, features, types, merits, limitations, suitability.
Public Sector Business Enterprises: Definition, features, objectives, merits, problems.

UNIT-III:
Market Structures, Product Life-Cycle (PLC), Pricing and Financial Accounting: Market Structures: Definition & common features of market and classifications of markets. Evaluation of market structures-Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly.
Product Life-Cycle and Pricing: Definition, various stages of PLC, and Life-Cycle Costs; objectives and methods of pricing.
Introduction to Financial Accounting: Definition, basic principles and double-entry book-keeping, practice of accounting process-Journal, ledger, trial balance and final accounts (simple problems)

UNIT-IV:
Financial Analysis through Ratios: Meaning, computation of ratios (i) Liquidity Ratios: Current Ratio and Quick Ratio, (ii) Solvency Ratios: Interest Coverage Ratio and Debt-Equity Ratio, (iii) Activity Ratios: Stock/Inventory Turnover Ratio and Debt Turnover Ratio, (iv) Profitability Ratios: Gross Profit Ratio, Net Profit Ratio & Earning Per Share(EPS) Ratio.

UNIT-V:
Management Accounting: Definition & nature of Management Accounting. Capital: Types of capital, factors influencing capital requirements, sources of mobilising Fixed and Working Capital.

UNIT-VI:
Cost Accounting: Cost Accounting: Definition, Types of costs – Opportunity cost, Explicit/Out-of-Pocket cost, Implicit/Imputed cost, Fixed cost, Variable cost, Semi-Variable cost, Differential cost, Sunk cost, Total cost, Average cost & Marginal cost. Break-Even/Cost-Volume-Profit (CVP) Analysis (Simple Problems).

TEXT BOOKS:
1. Managerial Economics and Financial Analysis by Aryasri, Tata McGraw-Hill, 2009
2. Managerial Economics by Varshney & Maheswari, Sultan Chand, 2009
3. Principles of Marketing: A South Asian Perspective by Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri and Eshan ul Haque, 13th Edition, Pearson Education/ Prentice Hall of India, 2010

REFERENCES:
1. Indian Economy by Misra S. K. and Puri, Himalaya Publishers
2. Textbook of Business Economics by Pareek Saroj, Sunrise Publishers
3. Financial Accounting for Management: An Analytical Perspective by Ambrish Gupta, Pearson Education
4. Managerial Economics by H. Craig Peterson & W. Cris Lewis; Prentice Hall of India

5. Guide to Proposal Writing by Jane C. Geever & Patricia McNeill, Foundation Centre

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https://www.amazon.com/exec/obidos/tg/detail/-/0879547030/ref=ase_learnerassoci-20/102-4728473-7056968?v=glance&s=books

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B.Tech. IV Semester - CSE, IT

L	T/P/D	C
3	0	3

(18PC1CS03) SOFTWARE ENGINEERING

COURSE OBJECTIVES:
- Identify the importance of software engineering principles and software process framework
- Understand contemporary approaches for design model and requirements validation
- Explore various metrics and quality assurance strategies
- Analyse different strategies for testing and risk management

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyse software engineering framework activities and process models that can be tailored with appropriate methods for developing the projects
CO-2: Understand the Requirements Engineering Process, Design relevant software system models and validate desired user model with realistic constraints.
CO-3: Develop quality software products by applying software testing strategies and product metrics over the entire system life cycle
CO-4: Define contemporary issues of handling risk management in Software development

UNIT-I:
Introduction to Software Engineering: Software characteristics, changing nature of software, software myths.
A Generic View of Process: Software engineering-A layered technology, process frame work, The Capability Maturity Model Integration (CMMI)

UNIT-II:
Process Models: The water fall model, Incremental process models, evolutionary process models, agile process
Software Requirements: Functional and non functional requirements, the software requirements document.
Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT-III:
Modeling with UML: Modeling Concepts and Diagrams - Use Case Diagrams - Class Diagrams - Interaction Diagrams - State chart Diagrams – Activity Diagrams - Package Diagrams - Component Diagrams – Deployment Diagrams -Diagram Organization-Diagram Extensions.

UNIT-IV:
Design Engineering: Design process and design quality, design concepts, design model.
Testing Strategies: A strategic approach to software testing, Testing Strategies, Black box and White box testing.

UNIT-V:

Product Metrics: Metrics for analysis model, Metrics for design model, Metrics for source code, Metrics for testing, Metrics for maintenance

Metrics for Process and Projects: Software measurement, Metrics for software quality

UNIT-VI:

Risk Management: Reactive vs. Proactive risk strategies, Software risks, Risk identification, Risk projection, RMMM plan

Quality Management: Quality concepts, Software quality assurance, Formal technical reviews, ISO 9000 Quality standards.

TEXT BOOKS:

1. Roger S. Pressman, Software engineering - A practitioner's Approach, McGraw-Hill International Edition, 6th Edition, 2001
2. Ian Sommerville, Software engineering, Pearson Education Asia, 7th Edition, 2000
3. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education

REFERENCES:

1. Pankaj Jalote - An Integrated Approach to Software Engineering, Springer Verlag, 1997
2. James F. Peters and Witold Pedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000
3. Ali Behforooz and Frederick J. Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996

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(18PC1IT03) JAVA PROGRAMMING

COURSE OBJECTIVES:
- **Understand** fundamental concepts and constructs of Java
- **Implement** Different object-oriented Concepts in Java
- **Develop** the concepts of Multi-Threading and IO-Streams
- **Establish** connection to the databases

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Solve different mathematical problems using OOP Paradigm
CO-2: Implement various error handling techniques in developing Applications
CO-3: Identify & Apply the Appropriate Collection framework in Problem Solving
CO-4: Design and Analyze the solutions for Thread, I/O and database connectivity concepts

UNIT-I:
Java Evolution: Java Features - How Java differs from C and C++ - Java and Internet - Java and World Wide Web - Web Browsers - Hardware and Software Requirements - Java Environment. Overview of Java Language: Simple Java Program - Java Program Structure - Java Tokens- Java Statements - Implementing a Java Program - Java Virtual Machine - Constants - Variables - Data types - Scope of Variables-Symbolic Constants-Type Casting and type promotions – Operators, Operator Precedence and Associativity - Control Statements – break - continue- Arrays-Multi dimensional arrays, Wrapper Classes - Simple examples.

UNIT-II:
Classes and Objects - Constructors – methods - this keyword – garbage collection-finalize - Overloading methods and constructors - Access Control- Static members – nested and inner classes – command line arguments - variable length arguments.
Inheritance: types of inheritance, benefits of inheritance. super keyword, Polymorphism, dynamic method dispatch –abstract classes – exploring String class.

UNIT-III:
Packages and Interfaces: Defining and accessing a package – understanding CLASSPATH – access protection importing packages – Interfaces - Defining and implementing an interface, Applying interfaces
Exception Handling-Fundamentals, usage of try, catch, multiple catch clauses, throw, throws and finally. Java built in Exceptions and creating user defined exceptions.

UNIT-IV:
The Collection Framework: Collection Objects – Sets, Lists, Queues, Maps – ArrayList-LinkedList - Vector– HashSet– LinkedHashSet– TreeSet– HashMap– Hashtable. Retrieving Elements from Collections – Enumeration, Iterator, List Iterator – String Tokenizer and Arrays Class – Sorting using Comparable and Comparator.

UNIT – V:

Multithreaded Programming: Java Thread life cycle model – Thread creation - Thread Exceptions - Thread Priority – Synchronization - Runnable Interface - Interthread Communication - Deadlock - Suspending, Resuming and stopping threads.

I/O Streams: File – Streams – Advantages - The stream classes – Byte streams – Character streams, Serialization, File Class and Methods.

UNIT – VI:

JDBC: JDBC Architecture, JDBC – ODBC Connectivity Steps, Connectivity steps with mysql database, Statement, PreparedStatement, CallableStatement, ResultSet, ResultSetMetaData, DatabaseMetaData, Transaction Management, Batch Processing, RowSet Interface. REST API's.

TEXT BOOKS:

1. The Complete Reference Java J2SE, 5th Edition, Herbert Schildt, TMH Publishing Company Ltd., New Delhi
2. Big Java, 2nd Edition, Cay Horstmann, John Wiley and Sons

REFERENCES:

1. Java How to Program, Sixth Edition, H. M. Dietel and P. J. Dietel, Pearson Education/PHI
2. Core Java 2, Vol. 1, Fundamentals, Cay S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education
3. Core Java 2, Vol. 2, Advanced Features, Cay S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education

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3	0	3

(18PC1IT04) FORMAL LANGUAGES AND AUTOMATA THEORY

COURSE OBJECTIVES:

- **To explain** the theoretical foundations of computer science concerning– the relationships between languages and machines, the inherent limits of what can be computed, and the inherent efficiency of solving problems using machines such as FA, PDA , LBA and TM
- **To identify** a language's location in the Chomsky hierarchy (regular sets, context-free, context-sensitive, and recursively enumerable languages)
- **To convert** among equivalently powerful notations for a language, including among DFAs, NFAs, and regular expressions, and between PDAs and CFGs
- **To build** the foundation for students to pursue research in the areas of automata theory, formal languages, compiler design and computational power of machines

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Recall the automata models in providing an effective solution for the given problems where no computations are involved

CO-2: Make use of the grammars in designing a computational model

CO-3: Construct the computational models to provide an effective solution for a given complex problems where computations are involved

CO-4: Determine the problems and categorize them into decidable and undecidable

UNIT-I:

Introduction: Alphabet, languages and grammars, Chomsky hierarchy of languages. Regular languages and finite automata: Deterministic Finite Automata (DFA), nondeterministic finite automata (NFA) and equivalence with DFA, NFA with ε - moves, Conversion to NFA without εmoves, minimization of finite automata, equivalence between FAs, Finite Automata with Outputs – Mealy machine, Moore machine and equivalence.

UNIT-II:

Regular Languages and Finite Automata: Regular sets, Regular expressions and languages, Operations on Languages - Union, Concatenation, Kleen Closure, equivalence between finite automata and regular expressions, Regular grammars: Definition, productions, derivation, right linear and left linear grammars, and equivalence with Regular grammars and finite automata, properties of regular languages, pumping lemma for regular languages

UNIT – III:

Context-free languages: Context-Free Grammars (CFG) and Languages (CFL), parse trees, sentential forms, right most and left most derivations of strings, ambiguity in CFG, Left recursion and left factoring in context free grammars,Chomsky and Greibach normal forms, Pumping Lemma for context-free languages, closure properties of CFLs

UNIT – IV:
Pushdown Automata: definition, model, acceptance of CFL, Pushdown Automata (PDA), Acceptance by final state and acceptance by empty stack and its equivalence, Equivalence of CFG and PDA (proofs not required), Nondeterministic Pushdown Automata (NPDA), **Context Sensitive Grammars**: Context-Sensitive Grammars (CSG) and languages, Linear Bounded Automata (LBA) and equivalence with CSG.

UNIT – V:
Turing Machine: The basic model for Turing Machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, unrestricted grammars and equivalence with Turing Machines, nondeterministic TMs and equivalence with deterministic TMs, variants of Turing Machines.

UNIT – VI:
Computability Theory: Undecidability: Church-Turing Thesis, universal Turing Machine, undecidable problems about languages. LR (0) grammar, decidability of problems, Post's Correspondence Problem - The classes P and NP.

TEXT BOOKS:
1. Introduction to Automata Theory, Languages and Computations, H. E. Hopcroft, and J. D. Ullman, Second Edition, Pearson Education, 2003
2.   Theory of Computer Science- Automata Languages and Computation, Mishra and Chandra Sekaran, Second Edition PHI

REFERENCES:
1. Elements of the theory of Computation, H. R. Lewis and C. H. Papadimitriou, Second Edition, Pearson Education/PHI, 2003
2. Introduction to Languages and the Theory of Computation, J. Martin, Third Edition, TMH, 2003
3. Formal Languages and Automata Theory, K. V. N. Sunitha , N. Kalyani, 1st Edition, TMH, 2010
4. Automata and Computability, Dexter C. Kozen Undergraduate Texts in Computer Science, Springer

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(18PC1CS04) DESIGN AND ANALYSIS OF ALGORITHMS

COURSE OBJECTIVES:
- To reinforce algorithms analysis methods
- Ability to analyse running time of an algorithm
- To understand different algorithm design strategies
- To familiarity with an assortment of important algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze asymptotic performance of algorithms
CO-2: Explain algorithmic design paradigms like Divide-and-Conquer, Dynamic programming, Greedy, Backtracking, Branch and Bound
CO-3: solve problems ongraphs and pattern matching algorithms
CO-4: Classify class P,NP, NP-hard and NP-complete problems

UNIT-I:
Introduction: Characteristics of algorithm. Analysis of algorithms: Asymptotic analysis of complexity bounds – best, average and worst-case behaviour; Performance measurements of Algorithm, Time and space trade-offs.
Divide and conquer General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication. Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT-II:
Fundamental Algorithmic Strategies: Greedy method: General method, applications-Job sequencing with dead lines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem, Huffman Codes.

UNIT-III:
Dynamic Programming: General method, Principle of optimality, applications-Multistage graphs, Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-IV:
Backtracking General method, applications- N-Queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.
Branch and Bound General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution

UNIT-V:
Graph and Pattern Matching Algorithms: Graph Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS), connected and biconnected components, Topological Sorting.
Pattern Matching Algorithms: Brute Force method, Knuth-Morris-Pratt algorithms

UNIT-VI:

NP Hard and NP-Complete problems: P, NP, NP-complete and NP-hard. Cook's theorem

Randomized Algorithm: Hiring Problem, Randomized Quick Sort

TEXT BOOKS:
1. Fundamentals of Computer Algorithms – E. Horowitz et al, Galgotia Publications
2. Introduction to Algorithms, 4th Edition, Thomas H. Cormen, Charles E. Lieserson, Ronald L. Rivest and Clifford Stein, MIT Press/McGraw-Hill

REFERENCES:
1. Algorithm Design, 1st Edition, Jon Kleinberg and Eva Tardos, Pearson
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T. Goodrich and Roberto Tamassia, Wiley
3. Algorithms – A Creative Approach, 3rd Edition, Udi Manber, Addison-Wesley, Reading, MA
4. Introduction to the Design and Analysis of Algorithms, Anany Levitin, 3rd Edition, Pearson Publications

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(18PC1CS05) DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES:
- **To introduction** of Data Base Management concepts and to give the description of structure of Data Base systems
- **To understand** concepts of ER model and model the data base for the given scenarios and prepare the database through normalization
- **To know** the features of various models of data and query representations
- **To introduce** the concepts and protocols related to transaction management and understand the concepts of data storage

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the fundamentals of relational systems including data models, database architectures, and database manipulations.
CO-2: Formulate queries using relational algebra, Relational Calculus and SQL
CO-3: Develop database schema for a given scenario using normalization techniques.
CO-4: Summarize the concepts of transaction processing, concurrency control, recovery and data storage techniques

UNIT-I:
Introduction to Databases and Database Management System: Database system Applications, Advantages of DBMS over File System, Data Models, Instances and schema, View of Data, Database Languages –DDL, DML, DCL, Database Users and Administrator, Database System Architecture.

UNIT-II:
Database Design and ER diagrams: Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Keys, Design Issues, Entity-Relationship Diagram, Extended E-R Features, Database Design with ER model, Database Design for a schema.

UNIT-III:
Introduction to the Relational Model: Structure of RDBMS, Integrity Constraints over Relations, Querying Relational Data, Relational Algebra and Relational Calculus.
Introduction to SQL: Data Definition commands, Data Manipulation Commands, Basic Structure, Set operations Aggregate Operations, Join Operations, Sub queries and correlated queries, views, Triggers, Cursors, Embedded SQL, Overview of NoSQL database.

UNIT-IV:
Functional Dependencies: Introduction, Basic Definitions, Trivial and Non trivial dependencies, closure of a set of dependencies, closure of attributes, irreducible set of dependencies.
Schema Refinement in Database Design: Problems Caused by Redundancy, Decompositions – Problem Related to Decomposition, Lossless Join Decomposition,

Dependency Preserving Decomposition, FIRST, SECOND, THIRD Normal Forms, BCNF, Multivalued Dependencies, FOURTH Normal Form.

UNIT-V:
Transaction Management: Transaction state, Implementation of atomicity and Durability, Concurrent executions – Serializability, Recoverability.
Concurrency Control: Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Dead Lock Handling
Recoverability: Failure Classification, Storage Structure, Recovery and Atomicity- Log Based recovery, Recovery with concurrent transactions, Checkpoints.

UNIT-VI:
File Organization: Organization of records in file, Data Dictionary Storage.
Indexing and Hashing: Basic Concepts, Ordered Indices+ Tree Index files, B tree index files – Static Hashing – Dynamic Hashing – Comparison of Indexing with Hashing.

TEXT BOOKS:
1. Database System Concepts, Silberschatz, Korth, Sudarshan, Seventh Edition, McGraw-Hill
2. Introduction to Database Systems, C. J. Date, Pearson Education

REFERENCES:
1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, Tata McGraw-Hill
2. Fundamentals of Database Systems, Elmasri Navathe Pearson Education
3. Database Systems Design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition, Cengage Learning

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(18PC2IT02) JAVA PROGRAMMING LABORATORY

COURSE OBJECTIVES:
- **To write** the Java Programs related to classes and methods
- **To build** Solutions for exceptions and basic I/O streams
- **To develop** solid Java programming skills and the ability to design simple case studies
- **To implement** the concepts of object oriented to develop a real world application

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze and design a computer program to solve real world problems based on object-oriented principles
CO-2: Implement concurrent programming using Multithreading concepts
CO-3: Identify appropriate Collection classes in problem solving
CO-4: Demonstrate connectivity of database and use various JDBC interfaces for connectivity

WEEK 1:
1. Write a Java program to print all the twin primes below 1000. (A twin prime is a prime number that differs from another prime number by two. (3, 5), (5, 7), (11, 13), (17, 19), (29, 31), (41, 43), .821, 823), etc. .
2. Write a Java program to implement matrix multiplication. (Take the input from the keyboard).
3. Write a Java program for sorting a given list of names in ascending order.

WEEK 2:
4. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the run of the two values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value in the Fibonacci sequence.
5. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.

WEEK 3:
6. Write a Java program that checks whether a given string is a palindrome or not from command line. Ex: MALAYALAM is a palindrome.
7. Write a Java program that prints all real solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, c and use the quadratic formula. If the discriminant b2 - 4ac is negative, display a message stating that there are no real solutions.
8. Write a Java program to implement constructor overloading.

WEEK 4:
9. Write a Java program to implement variable length arguments

10. Write a Java program to implement the use of inner classes.

WEEK 5:
11. Write a Java program to implement dynamic method dispatch.
12. Write a Java program that illustrates how run time polymorphism is achieved.

WEEK 6:
13. Write a Java program that illustrates the following
● Creation of simple package.
● Accessing a package.
● Implementing interfaces.
14. Write a Java program that illustrates built in exceptions.
15. Write a Java program to throw an exception "Insufficient Funds" while withdrawing the amount in the user account.

WEEK 7:
16. Write a Java program for creating multiple threads
a. Using Thread class   b. Using Runnable interface

17. Write a Java program for creating multiple threads. The main method sleeps for 10 seconds at the end of which all the threads should be terminated.

WEEK 8:
18. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

WEEK 9:
19. Write a Java program to create a file and write data into the file using Character Stream.
20. Write a Java program that reads on file name from the user then displays information about whether the file exists, whether the file is readable, whether the file is writable, the contents of file and the length of the file in bytes.

WEEK 10:
21. Write a Java program to perform the following operations on ArrayList, LinkedList, HashSet.
a. Insertion
b. Deletion
c. Retrieval

WEEK 11:
22. Write a program to store Employee objects in a TreeSet and sort the objects based on employee salary using Comparator/Comparable.

WEEK 12:

23. Write a Java program to establish the connection to the database and perform the following operations.
    a. Retrieval
    b. Insertion
    c. Deletion
24. Write a Java program to call the stored procedure from a database.

WEEK 13:

25. Explore REST APIs.

TEXT BOOKS:

1. The Complete Reference Java J2SE 5th Edition, Herbert Schildt, TMH Publishing Company Ltd., New Delhi
2. Big Java, 2nd Edition, Cay Horstmann, John Wiley and Sons

REFERENCES:

1. Java How to Program, Sixth Edition, H. M. Dietel and P. J. Dietel, Pearson Education/PHI
2. Core Java 2, Vol. 1, Fundamentals, Cay. S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education
3. Core Java 2, Vol. 2, Advanced Features, Cay. S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education

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(18PC2CS02) DATABASE MANAGEMENT SYSTEMS LABORATORY

COURSE OBJECTIVES:
● **To provide** the fundamental concepts of database creation
● **To implement** the concepts of Data manipulation
● **To develop** procedures for querying Multiple tables
● **To understand** the concepts of PL / SQL

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the given scenario, design it through ER model and normalize the schema
CO-2: Make use of basics of SQL and construct queries using SQL in database creation and interaction
CO-3: Apply PL/SQL for processing database
CO-4: Develop the solutions using database concepts for real time requirements

WEEK 1
        Implement the following using DUAL table:
            a) Character functions ,
            b) Numeric functions
            c) Date functions and
            d) Conversion functions.

WEEK 2
Practice DDL and DML commands on a basic table without integrity constraints.

WEEK 3
Practice DDL and DML commands on a Relational Database, specifying the Integrity constraints.
(Primary Key, Foreign Key, CHECK, NOT NULL)

WEEK 4
Apply the concepts of Joins, SET operations and SQL functions on any two relational schemas

WEEK 5-7
Apply the concepts of Joins, SET operations and SQL functions on the following schema:
        a) Employee

Name	Datatype	width	Constraint	Description
Empno	Integer	4	Primary Key	Employee Number
Ename	Varchar	20		Employee Name
Job	Char	12		Designation

Mgr	Integer	4		Manager Number
Hiredate	Date			
Sal	Number	(8,2)		Salary
Comm	Number	(6,2)		Commission
Deptno	Integer	2	Foreign Key	Department Number

b) Dept

Name	Datatype	width	Constraint	Description
Deptno	Integer	2	Primary Key	Department Number
Dname	Varchar	12		Department Name
Loc	Char	10		Location

c) Salgrade

Name	Datatype	width	Constraint	Description
Grade	Integer	1		Grade
Hisal	Integer	4		Upper scale of salary
Losal	Integer	5		Lower scale of salary

WEEK 8 – 11:
End to end implementation of a schema for a specific system along with the illustrations of querying.
A system is described by specifying the functional and non-functional requirements. Based on this description, the major entities are identified and modelled. Further the relationships are modelled to form the initial schema. The schema is further refined by removing redundancies through normalization. Also based on the query requirements, the schema is remodelled to facilitate querying. Finally an illustration of various queries to extract required information from the system is shown using SQL / MYSQL.
 The five major workflows to be implemented are:
1. System Specification
2. Design of Initial Schema
3. Schema refinement using functional dependencies and normalization
4. Schema refinement using query requirements
5. Illustration of querying the system using SQL / MYSQL.

WEEK 12
Implementation of PL / SQL concepts

WEEK 13
Creating and executing CURSORS.

WEEK 14
Creation and application of TRIGGERS on a Relational schema.

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(18PC2IT03) IT WORKSHOP

COURSE OBJECTIVES:
- **To train on** PC Hardware and productivity tools including Word, Excel, PowerPoint
- **To learn** the MATLAB environment and its programming fundamentals
- **To ability** to write programs using commands and functions
- **To able** to handle polynomials, and use 2D graphic commands
- **To implement** Image pre-processing techniques

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Customize their PC and their own documents
CO-2: Devise Their Own Content Using Word And Excel
CO-3: Understand the use of various MATLAB commands
CO-4: Design their own algorithms using MATLAB environment

LIST OF EXPERIMENTS:

WEEK-1

1. To identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral. Students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.(Audio-Visual Presentation)

2. Hardware Trouble shooting: Hardware trouble shooting of a PC which does not boot due to improper assembly or defective peripherals. Identify the problem and fix it to get the computer back to working condition.(Audio-Visual Presentation)

3. Software Troubleshooting: Malfunctioning of CPU due to system software problems. Fix the problem to get back computer to working condition.(Audio-Visual Presentation)

WEEK-2
4. Students customize their web browsers with the LAN proxy settings, bookmarks, search tool bars and pop up blockers. Also, plug-ins like Macro-media Flash should be configured. Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google by using filters.
(Audio-Visual Presentation& Practice)

5.Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their

computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.(Audio-Visual Presentation& Practice)

WEEK-3 & WEEK-4

6. Using **Word** to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word. Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clip-art, Drawing toolbar and Word Art, Formatting Images, Text boxes, Paragraphs and Mail Merge in word.

WEEK-5 & WEEK-6

7. Using **excel** creating a Scheduler and Calculating GPA– Features to be covered:- Grid lines, Format Cells, Summation, auto fill, Formatting Text, Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Sorting, Conditional formatting.

WEEK-7 & WEEK-8

8.Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts, Lines and Arrows , Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides in and Power point. Students will be given model power point presentation which needs to be replicated.

WEEK-9 & WEEK-10

9. Practicing MATLAB environment with simple exercises to familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.
10. Data types, Constants and Variables, Character constants, operators, Assignment statements, Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.

WEEK-11

11. Input-Output functions, Reading and Storing Data. Vectors and Matrices, commands to operate on vectors and matrices, matrix Manipulations.
12.Arithmetic operations on Matrices, Relational operations on Matrices, Logical operations on Matrices, Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials.

WEEK-12

13. Graphics: 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart.
14. Read an Image and construct Color Histogram.

WEEK-13

15. Installation of Windows and Linux OS (Audio-Visual Presentation).

WEEK-14

16. Practice of MS-DOS & Linux commands (Basic commands)

TEXT BOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education
2. Introduction to Computers, Peter Norton, 6/e, McGraw-Hill
3. Upgrading and Repairing, PC's 18/e, Scott Muller QUE, Pearson Education
4. MATLAB and its Applications in Engineering, Bansal R. K, Goel A. K., Sharma M. K., Pearson Education, 2012

REFERENCES:

1. Comdex Information Technology Course Tool Kit by Vikas Gupta, Wiley Dreamtech
2. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft)
3. MATLAB-An Introduction with Applications, Amos Gilat, Wiley India, 2009
4. Programming in MATLAB for Engineers, Stephen J. Chapman, Cengage Learning, 2011

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B.Tech. V Semester - CSE, IT

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(18PC1IT05) OPERATING SYSTEMS

COURSE OBJECTIVES:
- Study the basic concepts and functions of operating systems
- Summarize various approaches to solve the problem of process concurrency in an operating system
- Evaluate the memory usage trade-offs in terms of size (main memory, auxiliary memory) and   processor speed
- Understand disk storage strategies and file strategies with protection and security issues

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify System calls and evaluate process scheduling criteria OS
CO-2: Develop procedures for process synchronization scheduling services of an OS
CO-3: Describe the role of paging, segmentation, and virtual memory in operating systems
CO-4: Distinguish disk access, file systems supported by an OS and extend operating systems protection & security aspects

UNIT – I:
Computer System and Operating System Overview: Overview of Computer System hardware, Operating System Objectives and functions Operating System Services, System Calls, System Programs.
CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms and evaluation.

UNIT – II:
Linux Utilities: File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts are using system commands in awk.

UNIT – III:
Process Management: Process Description, Process Control Block, Process States, Threads Overview.
Concurrency: Cooperating Processes, Inter-process Communication, Principles of Concurrency, Mutual Exclusion, Software and hardware approaches, Semaphores, Monitors, Message Passing, Classic problems of synchronization.
Inter Process Communication: Introduction to IPC, Pipes, and FIFOs, Introduction to three types of IPC-message queues, semaphores and shared memory. Message Queues Kernel support for messages, client/server example.

UNIT – IV:
Principles of Deadlock: System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlocks, Dining philosopher's problem.

UNIT-V:
Memory Management: Basic concepts, Swapping, Contiguous memory allocation, Paging, Segmentation, Virtual memory, Demand paging, Page-replacement algorithms, Thrashing.
Secondary Storage Structure: Disk structure; Disk scheduling, Disk management, Swapspace Management, RAID structure, Stable-storage Implementation
Case studies: windows, Unix, Linux.

UNIT –VI:
File Management: File system-File concepts, File System Structure, Inodes, File Attributes, File types, Access methods, Symbolic links & hard links, Directory structure, Filesystem mounting, Implementing file systems-File system structure and implementation, Directory implementation, Allocation methods, Free-space management, Efficiency and performance
Protection &Security: Protection mechanisms, OS Security issues, threats, Intruders, Viruses,
Case Studies: windows, Unix, Linux.

TEXT BOOKS:
1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7thEdition, John Wiley
2. Unix Concepts and Applications, Sumitabha Das, 4thEdition, TMH, 2006

REFERENCES:
1. Modern Operating Systems, Andrew S. Tanenbaum, 2nd Edition, Pearson/PHI
2. Operating Systems – A Concept Based Approach, D. M. Dhamdhere, 2ndEdition
3. Unix System Programming using C++, T.Chan, PHI
4. Operating Systems - Internal and Design Principles, Stallings, 5thEdition, Pearson Education/PHI, 2005

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(18PC1CS11) COMPILER DESIGN

COURSE OBJECTIVES:
- Outline the usage of different phases of compiler
- Understand the various techniques of parsing in a compilation process
- Utilize the compiler optimization methods to improve the intermediate
- Explain the code generator for the optimized code

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Illustrate the phases of compilation and develop the lexical analyzer
CO-2: Make use of parsing techniques in determining the syntactical structure of programming language constructs
CO-3: Translate the programming language constructs into Intermediate representations
CO-4: Apply code optimization and code generation techniques on intermediate code in generating target code

UNIT – I:
Overview of Compilation: Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, LEX tool introduction.

UNIT – II:
Top-Down Parsing: Context free grammars, Top down parsing –Backtracking, recursive descent parsing, Predictive parsing, LL(1) parsing, Pre-processing steps required for predictive parsing.

UNIT – III:
Bottom-Up Parsing: Shift-Reduce parsing, SLR, CLR and LALR parsing, handling ambiguous grammar. YACC – Automatic parser generator tool.

UNIT – IV:
Syntax Directed Translation: Syntax directed definitions, Construction of syntax trees.
Runtime Environment: Storage Organization, Activation records, Storage allocation strategies.
Intermediate Code Generation: Intermediate forms of source Programs – abstract syntax tree, three address codes, Implementation of 3-address statements. Conversion of popular Programming languages language Constructs into Intermediate code forms–assignment statements, Boolean expressions.

UNIT – V:
Code Optimization: Types of code optimization, Criteria for code improving transformation, Principle sources of optimization – function preserving transformations, loop optimizations, DAG based Optimization of basic blocks.

UNIT – VI:

Code Generation: issues of code generation of a code generator, a simple code generator, register allocation and assignment, peephole optimization, Generating code from DAGS- Rearranging the order, A Heuristic ordering for DAGs, Labelling algorithm for code generation.

TEXT BOOKS:

1. Compilers: Principles, Techniques, and Tools, A.V. Aho,RaviSethi, J.D.Ullman, Pearson Education
2. Modern Compiler Implementation in C, Andrew N. Appel, Cambridge University Press

REFERENCES:

1. Lex& Yacc, John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Modern Compiler Design, Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley Dreamtech

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(18PC1IT06) COMPUTER NETWORKS

COURSE OBJECTIVES:
- To develop an understanding of modern network architectures from a design and performance perspective
- To introduce the student to the major concepts, principles involved in Data Link Layer and Network Layer
- To provide an opportunity to learn how to maintain QoS in Network & maintaining of Congestion Control
- To get an idea of Application Layer functionalities and importance of Security in the Network

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understand modern network architectures from a design and performance perspective

CO-2: Illustrate the various flow and error control techniques and identify the best method for efficient data transmission and applying various routing algorithms for a network and determine the optimal path

CO-3: Interpret QoS improving techniques, analysis of various Congestion Control mechanisms and implementation of TCP and UDP

CO-4: Analyze the functions of various Application Layer protocols and understanding the importance of Security in the Network

UNIT – I:
Data Communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, Overview of LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth Utilization: Multiplexing - Frequency division, Time division and Wave division, Conceptson spread spectrum..

UNIT – II:
Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error controlprotocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA

UNTI – III:
Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP,RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT – IV:
Transport Layer: Process to Process Communication, User Datagram Protocol (UDP),Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT – V:
Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Firewalls.

UNIT – VI:
Security: Cryptography- Symmetric-Key Cryptography, Asymmetric-Key Cryptography, Network Security- Security Services, Message Confidentiality, Message Integrity, Message Authentication, Digital Signature, Entity Authentication, Key Management.

TEXT BOOKS:
1. Data Communication and Networking, Behrouz A. Forouzan,4th Edition, Tata McGraw-Hill
2. Computer Networks, Andrew S. Tanenbaum, 8thEdition, Pearson New International Edition

REFERENCES:
1. Data and Computer Communication, William Stallings, 8thEdition, Pearson Prentice Hall India
2. Internetworking with TCP/IP, Volume 1, Douglas Comer, 6thEdition, Prentice Hall of India
3. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley

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(18PE1IT01) AGILE SOFTWARE PROCESS

COURSE OBJECTIVES:
- Course imparts knowledge to students in the basic concepts of Agile Software Process
- Explores agile methodology and its development

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the basic concepts of Agile Software Process
CO-2: Gain knowledge in the area of various Agile Methodologies
CO-3: Develop Agile Software Process
CO-4: Know the principles of Agile Testing

UNIT – I:
Introduction: Software is new product development – Iterative development – Risk-Driven and Client-Driven iterative planning – Time boxed iterative development – During the iteration, No changes from external stakeholders – Evolutionary and adaptive development - Evolutionary requirements analysis – Early "Top Ten" high-level requirements and skilful analysis – Evolutionary and adaptive planning – Incremental delivery – Evolutionary delivery – The most common mistake – Specific iterative and Evolutionary methods.

UNIT – II:
Agile and Its Significance-I: Agile development – Classification of methods – The agile manifesto and principles – Agile project management – Embrace communication and feedback – Simple practices and project tools – Empirical Vs defined and prescriptive process – Principle-based versus Rule-Based – Sustainable discipline: The human touch – Team as a complex adaptive system – Agile hype – Specific agile methods.

UNIT – III:
Agile and Its Significance-II: The facts of change on software projects – Key motivations for iterative development – Meeting the requirements challenge iteratively – Problems with the waterfall. Research evidence – Early historical project evidence – Standards-Body evidence – Expert and thought leader evidence – A Business case for iterative development – The historical accident of waterfall validity

UNIT – IV:
Agile Methodology: Method overview – Lifecycle – Work products, Roles and Practices values – Common mistakes and misunderstandings – Sample projects – Process mixtures – Adoption strategies – Fact versus fantasy – Strengths versus "Other" history.

UNIT – V:
Case Study: Agile – Motivation – Evidence – Scrum – Extreme Programming – Unified Process – Evo – Practice Tips.

UNIT – VI:

Agile Practicing and Testing: Project management – Environment – Requirements – Test – The agile alliances – The manifesto – Supporting the values – Agile testing – Nine principles and six concrete practices for testing on agile teams.

TEXT BOOKS:
1. Agile Testing, Elisabeth Hendrickson, Quality Tree Software Inc., 2008
2. Agile and Iterative Development – A Manager's Guide, Craig Larman, Pearson Education, 2004

REFERENCES:
1. Agile Software Development Series, Alistair, Cockburn, 2001
2. www.agileintro.wordpress.com/2008
3. www.serena.com/docs/repository/solutions/intro-to-agile-devel.pdf
4. www.qualitytree.com

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(18PE1IT02) DATA MINING

COURSE OBJECTIVES:
- Familiarize to the concepts and techniques for building a Data Warehouse
- Apply pre-processing techniques to extract information from raw data
- Understand the datamining skills for resolving practical problems
- Implement the algorithms in supervised and unsupervised learning

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Appraise raw input and process to generate relevant data for a range of data mining algorithms
CO-2: Extract and measure interesting patterns from hetero generous databases
CO-3: Identify The appropriate data-mining algorithm for resolving the real-time applications
CO-4: Design and Implement Data-mining projects using sample, realistic datasets and modern tools

UNIT – I:
Introduction: Fundamentals of data mining, KDD process, Data Mining functionalities, Classification of Data Mining systems, Data Mining task primitives, Integration of a Data mining system with a Database or a Data warehouse, Major issues in Data Mining.
Data Preprocessing: Need for data preprocessing, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT – II:
Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse architecture, Data Warehouse implementation, From Data Warehousing to Data Mining.
Data Cube Computation and Data Generalization: Efficient methods for Data Cube computation, Further Development of data cube and OLAP Technology, Characterization and Discrimination: Attribute-Oriented Induction

UNIT – III:
Mining Frequent, Associations and Correlations: Basic concepts, Frequent Itemset mining methods, Mining multilevel association rules from Transaction Databases, Mining Multidimensional association rules from Relational databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT – IV:
Classification and Prediction: Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Support Vector Machines (SVMs), Other Classification Methods. Prediction, Classifier Accuracy.

UNIT – V:
Cluster Analysis Introduction: Types of Data in Cluster Analysis, Major Clustering methods, Partitioning Methods, Density-Based methods, Grid-Based methods, Model-Based Clustering methods.

UNIT – VI:
Outlier Analysis: Statistical Distribution-Based Outlier detection, Distance-based Outlier detection, Density-based local Outlier detection, Deviation-Based Outlier detection.
Mining Complex Types of Data: Social Network Analysis, Spatial Data Mining, Multimedia Data Mining, Mining Time-Series data, Mining sequence Patterns in Transactional Databases, Text Mining, Mining the World Wide Web.

TEXT BOOKS:
1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier, 2006
2. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Addison-Wesley, 2005, ISBN: 0321321367

REFERENCES:
1. Data Mining Techniques, Arun K. Pujari, University Press
2. Mining Introductory and Advanced Topics, Margaret H. Dunham, Pearson Education
3. Lecture Notes on Data Mining, Micheal W.Berry, Murray Browne, World Scientific Publishing Co.
4. Data Warehousing in the Real World, Sam Anahory & Dennis Murray, Pearson Edn. Asia

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(18PE1CS01) MOBILE COMPUTING

COURSE OBJECTIVES:
- To understand the basic concepts of mobile computing and mobile telecommunication system
- To be familiar with the network layer protocols and Ad-Hoc networks
- To know the basis of transport and application layer protocols
- To gain knowledge about different mobile platforms and application development

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Illustrate the basics of mobile telecommunication systems and the generations of telecommunication systems in wireless networks

CO-2: Determine the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network

CO-3: Analyze the functionality of Transport and Application layers

CO-4: Develop a mobile application using android/blackberry/ios/Windows SDK

UNIT – I:
Introduction: Introduction to Mobile Computing – Applications of Mobile Computing, Limitations and Architecture- Generations of Mobile Communication Technologies-Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA- CDMA. Wireless LAN: Infrared vs radio transmission, Infrastructure and ad hoc networks, IEEE 802. 11-System architecture, protocol architecture, Physical layer, Medium access control layer and MAC management.

UNIT – II:
Mobile Telecommunication System: Introduction to Cellular Systems – GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS- UMTS – Architecture – Handover – Security. HIPER LAN-protocol architecture, physical layer channel access control sub layer, information bases and networking. Bluetooth-User scenarios, Physical layer, MAC Layer, Networking, Security and Link Management

UNIT – III:
Mobile Network Layer: Mobile IP: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Registration, Tunneling and Encapsulation, Route Optimization – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV, Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security.

UNIT – IV:
Mobile Transport and Application Layer: Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks. WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML

UNIT – V:

Database Issues: Database Issues: Database Hoarding& Caching Techniques, Client –Server Computing & Adaptation, Transactional Models, Query Processing, Data Recovery Process & QoS Issues. Data Dissemination and Synchronization: Communications Asymmetry Classification of Data Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Methods, Digital Audio and Video Broadcasting (DAB & DVB), Data Synchronization –Introduction, Software, and Protocols

UNIT – VI:

Mobile Platforms and Applications: Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues

TEXT BOOKS:
1. Mobile Communications, Jochen Schiller, Second Edition, PHI, 2003
2. Mobile Computing, Raj Kamal, Oxford University Press, 2007

REFERENCES:
1. Fundamentals of Mobile Computing, Prasant Kumar Pattnaik, Rajib Mall, PHI Learning Pvt. Ltd, New Delhi – 20
2. Handbook of Wireless Networks and Mobile Computing, Stojmenovic and Cacute, Wiley, 2002
3. Introduction to Wireless and Mobile systems, Dharma Prakash Agarval, Qing and An Zeng, Thomson Asia Pvt. Ltd., 2005
4. Principles of Mobile Computingǁ, Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Springer, 2003

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(18PE1CS05) COMPUTER GRAPHICS

COURSE OBJECTIVES:
- Analyze the basics of graphics and its representations
- Identify various 2D and 3D transformation techniques used in graphics
- Understand the principles of Visible Surface Detection Methods
- Discuss the animation design sequence

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the various basic algorithms to draw the object
CO-2: Differentiate 2D and 3D Transformations and Viewing
CO-3: Apply the various techniques to eliminate hidden surfaces of an object
CO-4: Create animation sequences of an object

UNIT – I:
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and workstations and input devices Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood fill algorithms.

UNIT – II:
2-D Geometrical Transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.
2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to viewport coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT – III:
Three-dimensional Geometric Transformations: Translation, Rotation, Scaling, composite transformations
Three-dimensional Viewing: viewing pipeline, viewing coordinates, Projections, Clipping.

UNIT – IV:
Visible Surface Detection Methods: Classification, back-face detection, depth-buffer, scanline, depth sorting, BSP-tree methods, area sub-division and octree methods.

UNIT – V:
Three dimensional object representations: Polygon surfaces, Polygon tables, Plane equations, Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations - Bezier curves and surfaces - B-Spline curves and surfaces.

UNIT – VI:

Computer Animation: Design of Animation Sequence, General computer Animation functions, Raster animation, Computer animation languages, key frame systems, motion specifications

TEXT BOOKS:

1. Computer Graphics C Version, Donald Hearn & M. Pauline Baker, Pearson Education, New Delhi, 2004
2. Computer Graphics Principles & Practice, Second Edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education

REFERENCES:

1. Procedural Elements for Computer Graphic, David Rogers, Tata McGraw Hill, 2nd Edition
2. Computer Graphics, Steven Harington, TMH
3. Principles of Interactive Computer Graphics, Neuman and Sproul, TMH

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(18PE1IT03) CYBER SECURITY

COURSE PRE-REQUISITES: Basic Knowledge of Computers, Basic Knowledge of Networking and Internet, Hands-on Windows Operating System

COURSE OBJECTIVES:
- Identify the key components of cyber security in network
- Describe the techniques in protecting Information security
- Define types of analyzing and monitoring potential threats and attacks
- Access additional external resources to supplement knowledge of cyber forensics and laws

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Design and implement suitable security technologies
CO-2: Categorize cybercrimes and classification of Social Engineering and Cyber stalking
CO-3: Demonstrate cyber offenses tools, methods used in cyber crime
CO-4: Understand computer forensics, cybercrime and cyber terrorism

UNIT – I:
Introduction to Cyber Crime: Introduction Cybercrime: Definition and Origins of the word, Cybercrime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, E-mail Spoofing, Spamming, Cyber defamation, Internet Time Theft, Salami Attack/ Salami Technique, Data Diddling, Forgery, Web Jacking, Newsgroup Spam/ Crimes Emanating from Usenet Newsgroup, Industrial Spying/Industrial Espionage, Hacking, Online Frauds, Pornographic Offenses, Software Piracy, Computer Sabotage, EMail Bombing/Mail Bombs, Usernet Newsgroup as the Source of Cybercrimes, Computer Network Intrusions, Password Sniffing, Credit Card Frauds, Identity Theft.

UNIT – II:
Cyber Offenses:
How Criminals Plan Them: Introduction, Categories of Cybercrime, How Criminals Plan the Attacks, Reconnaissance, Passive Attacks, Active Attacks, Scamming and Scrutinizing Gathered Information, Attack (Gaining and Maintaining the System Access), Social Engineering, Classification of Social Engineering, Cyber stalking, Types of Stalkers, Cases Reported on Cyber stalking, How Stalking Works?, Real-Life Incident of Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The fuel for Cybercrime, Botnet, Attack Vector, Cloud Computing, Why Cloud Computing?, Types of Services, Cybercrime and Cloud Computing.

UNIT – III:
Tools and Methods Used In Cyber Crime: Introduction, Proxy Servers and Anonymizers, Phishing, How Phishing Works, Password Cracking, Online Attacks, Offline Attacks, Strong, Weak and Random Passwords, Random Passwords, Keyloggers and Spywares, Software Keyloggers, Hardware Keyloggers, Antikeylogger, Spywares, Virus and Worms, Types of Viruses, Trojan Horses and Backdoors, Backdoor, How to Protect from

Trojan and Backdoors, Steganography, Steganalysis, Dos and DDos Attacks, Dos Attacks, Classification of Dos Attacks, Types of Levels of Dos Attack, Tools Used to Launch Dos Attacks, Ddos Attacks, How to protect from Dos/Ddos Attacks, SQL Injection, Steps for SQL Injection Attack, How to Prevent SQL Injection Attacks.

UNIT – IV:
Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, The Rules of Evidence, Forensics Analysis of E-Mail, RFC2822, Digital Forensics Life Cycle, The Digital Forensics Process, The Phases in Computer Forensics/Digital Forensics, Precautions to be Taken when Collecting Electronic Evidence, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Typical Elements Addressed in a Forensics Investigation Engagement Contract , Solving a Computer Forensics Case, Computer Forensics and Steganography, Rootkits, Information Hiding, Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics, Technical Challenges: Understanding the Raw Data and its Structure, The Legal Challenges in Computer Forensics and Data Privacy Issues, Special Tools and Techniques, Digital Forensics Tools Ready Reckoner, Special Technique: Data Mining used in Cyber forensics, Forensics Auditing.

UNIT – V:
Cybercrime and   Cyberterrorism:
Social,Political,   Ethical and Psychological Dimensions: Introduction, Intellectual Property in the Cyberspace, Copyright, Patent, Trademarks, Trade Secret, Trade Name, Domain Name, The Ethical Dimension of Cybercrimes, Ethical Hackers: Good Guys in Bad Land, The Psychology, Mindset and Skills of Hackers and Other Cybercriminals, Inside the Minds and Shoes of Hackers and Cybercriminals, Hackers and Cybercriminals: Evolution of Technical prowess and Skills, Ethical Hackers, Sociology of Cybercriminals, Personality Traits of Cybercriminals and Younger Generation's views about Hacking, Information Warfare: Perception or An Eminent Reality?, Cyberwar Ground is HOT, Cyber Jihadist on the Rise

UNIT – VI:
Fundamentals of Cyber Law: Evolution of the IT Act, Genesis and Necessity , Salient features of the IT Act, 2000, various authorities under IT Act and their powers, Penalties & Offences, amendments, Impact on other related Acts Cyber Space Jurisdiction - Jurisdiction issues under IT Act, 2000- Traditional principals of Jurisdiction - Extra-terrestrial Jurisdiction- Case Laws on Cyber Space Jurisdiction
Sensitive Personal Data or Information (SPDI) in Cyber Law (a) SPDI Definition and Reasonable Security Practices in India (b) Reasonable Security Practices – International perspective.

TEXT BOOKS:
1. Cyber Security - Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunit Belpure, Wiley
2. Cyber Law & Cyber Crimes, Advocat Prashant Mali, Snow White Publications, Mumbai

REFERENCES:

1. Management of Information Security, M. E. Whitman, H. J. Mattord, Nelson Education, 3rd Edition, Cengage Learning, 2011
2. Guide to Computer Forensics and Investigations, B. Nelson, A. Phillips, F. Enfinger, C. Steuart, 4th Edition, Nelson Education / Cengage Learning, 2010
3. Cyber Law in India, Farooq Ahmad, Pioneer Books
4. Information Technology Law and Practice, Vakul Sharma, Universal Law Publishing Co. Pvt. Ltd

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester	**L**	**T/P/D**	**C**
	0	**2**	**1**

(18HS2EN02) ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY
(Common to all branches)

COURSE OBJECTIVES:
- Enable the students to create clear, accurate, and succinct content to write business letters, resume, SOP, Proposals and Technical Reports for academics as well as for workplace
- Enable students to adjust technical content to meet the needs of a specific target audience
- Groom students to speak accurately and fluently and prepare them for real world activities through behavioral skills
- Train students in soft skills through role play and group discussion to improve their EQ

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Summarize and synthesize information and produce technical writing that is required in academics as well as in the engineering profession
CO-2: Write covering letters, resume, SOP, Project Proposals and Technical Reports
CO-3: Speak fluently and address a large group of audience and participate in debates and discussions
CO-4: Negotiate terms, manage situations through interpersonal skills, persuade people and make quick decisions

UNIT – I:
Application Writing:
1. Cover Letter & Resume Writing
2. Statement of Purpose

UNIT – II:
Correspondence Skills:
1. E-Correspondence
2. Netiquette
3. Social Media Etiquette

UNIT – III:
Employability Skills-1:
1. Grooming
2. Social Etiquette
3. Nonverbal Communication

UNIT – IV:
Employability Skills-2:
1. Group Discussions
2. Interview Skills – Face to Face
3. Interview Skills – Telephonic / Video

UNIT – V:
Presentation Skills:
1. Oral Presentations
2. Powerpoint Presentations

UNIT – VI:
Report Writing:
1. Technical Report Writing
2. White Paper Writing
3. Writing Agenda & Minutes

TEXT BOOKS:
1. Effective Technical Communication, Ashraf, Rizvi M., 2nd Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2005
2. Technical Communication, A Reader-Centered Approach, Anderson, Paul V. Reports in Paul V. Anderson's, 9th Edition, Heinle, Boston, 2003
3. Technical Communication: A Practical Approach, William S. Pfeiffer, 8th Edition, Pearson, 2012

REFERENCES:
1. Technical Communication, Burnett, Rebecca, 6th Edition, Cengage Learning, 2001
2. Technical Writing Process and Product, Gerson Sharon J. and Steven Gerson, 3rd Edition, Prentice Hall, 1999
3. Technical Communication: Situations and Strategies, Markel, Mike, 8th Edition, 2006-07
4. Business Correspondence and Report Writing, R. C. Sharma and K. Mohan, 20th Edition, Tata McGraw-Hill, New Delhi, 2017
5. Technical Communication, Principles and Practices, M. Raman and S. Sharma, 3rd Edition, OUP, 2015

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester - CSE, IT

	L	T/P/D	C
	0	2	1

(18PC2IT04) OPERATING SYSTEMS AND COMPUTER NETWORKS LABORATORY

COURSE OBJECTIVES:
- Learn and understand various error correction and detection mechanisms
- Examine basic networking commands and networking algorithms
- Explore operating system processor scheduling and deadlock mitigation techniques
- Analyze various file, disk and memory management mechanisms

COURSE OUTCOMES: After completion of the course, the student should be able to:
CO-1: Implement data link layer functionalities such as framing, error detection mechanisms
CO-2: Able to design and implement various network application such as data transmission between client and server, file transfer, real-time multimedia transmission
CO-3: Implement various processor scheduling and page replacement algorithms
CO-4: Implementation of disk scheduling and file allocation strategies

OPERATING SYSTEMS LABORATORY

WEEK 1
1.   Simulate the following CPU scheduling algorithms
      a)Round Robin   b) SJF   c) FCFS

WEEK 2
2.   Simulate the following algorithms
      a) Best fit   b) worst fit   c) first fit

WEEK 3
3.   Simulate the following file allocation strategies
      a) Sequential   b) Indexed   c) Linked

WEEK 4
4.   Simulate algorithms for deadlock avoidance and deadlock detection

WEEK 5
5.   Simulate the following page replacement algorithms
      a) FIFO   b) Optimal   c) LRU

WEEK 6
6.   Simulate the following disk scheduling algorithm
      a) SCAN   b) CSCAN   c) LOOK

WEEK 7
Lab internal

COMPUTER NETWORKS LABORATORY

WEEK 8
7.   Implement the data link layer framing methods such as character, character stuffing and bit stuffing.

WEEK 9
8.   Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.

WEEK 10
9.   Basic Networking commands.

WEEK 11
10.   Establishing a network between computers.

WEEK 12
11.   Configuring FTP Server for file sharing.

WEEK 13
12.   Implement Dijkstra's algorithm to compute the Shortest path through a graph.

WEEK 14
Lab internal

TEXT BOOKS:
1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition TMH, 2006

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester

L	T/P/D	C
0	4	2

(18PW4IT03) DESIGN THINKING

COURSE OBJECTIVES:
- Inculcate core design principles and applied creativity to develop innovative strategies that better connect engineers with their end users
- Build mindset leading to flow of creative ideas, validating those ideas and prioritizing the best ones
- Incorporate tools that designers need to take a design project from inspiration and insights to ideation and implementation
- To instil full scope of organizational innovation and strategy through knowledge, insight and analytical skills

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Use design thinking and hypothesis-driven innovation processes to develop viable solutions to user challenges
CO-2: Use multiple brainstorming techniques to find innovative solutions
CO-3: Develop and test a business model or business case to support the viability of the solution
CO-4: Prototype a solution to a user challenge
CO-5: Investigate the cultural, emotional, technological and business factors relevant to developing new product or service design concept

Module 1: Revisiting Design Thinking
Creative thinking as basis of innovation; Empathy process for deep understanding of challenge with practical ingenuity; Making sense of observations and insights; Defining a point of view and context
Design thinking skills for Problem Discovery, Definition, and Ideation – Identifying problems in daily lives and in the world at large, Understanding user and customer perspectives, Thinking from the problem before thinking of a solution

Module 2: Ideation Process
Clear Articulation of problem statement with focus on latent needs; Brainstorming potential solutions; Ideation methods with case-study based approach to using Systematic Inventive Thinking (SIT) Methods such as Addition, Subtraction, Multiplication, Division and Task Unification
Strategic Innovation for competition in future: Linear Innovation vs. non-linear innovation, Understanding and identifying weak signals, 3-box thinking, 3-Box framework and Box-3 ideation

Module 3: Designing Customer Experience
Understanding Innovation through Design Thinking; Enhancing Customer Experience; Service Design and Development Process and Case Studies; Service Experience Cycle and Case Studies

Module 4: Sustainable Design Approaches
Concern for Environment and Sustainability in Design, Case Studies to understand good Design For Environment (DFE) Decisions; Design Considerations in the five stages of the Product Life Cycle

Module 5: Integrative Engineering Design Solutions
Identifying and resolving issues with working in diverse teams, Modularising, prototype building by different engineering disciplines within the team, validated learning with accessible metrics

Module 6: Capstone Project (Interdisciplinary)
Applying Design Thinking Principles and Methods for Ideation and Prototyping, Testing Solution, Refining Solution, and Taking the Solution to the Users

TEXT BOOKS:
1. 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization, Vijay Kumar, John Wiley & Sons, ISBN: 978-1118083468, 2012
2. Living with Complexity, Donald A Norman, MIT Press, ISBN: 978-0262528948, 2016
3. Design Thinking for Entrepreneurs and Small Businesses: Putting the Power of Design to Work, Beverly Rudkin Ingle, A Press, ISBN: 978-1430261810, 2013

REFERENCES:
1. Emotionally Durable Design: Objects, Experiences and Empathy, Jonathan Chapman, 2nd Edition, Routledge, ISBN: 978-0415732161, 2015
2. Innovation Design: How Any Organization Can Leverage Design Thinking to Produce Change, Drive New Ideas, and Deliver Meaningful Solutions, Thomas Lockwood, Edgar Papke, New Page Books, ISBN: 978-1632651167, 2017
3. Design Thinking Business Analysis: Business Concept Mapping Applied, Thomas Frisendal, Springer, ISBN: 978-3642434822, 2012
4. Chapter 1: A Simple Framework for Leading Innovation, The Three Box Solution, HBR Press, 2016
5. Design a Better Business: New Tools, Skills and Mindset for Strategy and Innovation, Patrick Van Der Pijl, Justin Lokitz, Lisa Kay Solomon, Erik van der Pluijm, Maarten van Lieshout, Wiley, ISBN: 978-8126565085, 2016

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester	L	T/P/D	C
	0	2	1

(18PW4IT02) INTERNSHIP

COURSE OUTCOMES: After completion of the course, students should be able to
CO-1: Gain exposure to the current technological developments relevant to the subject area of training
CO-2: Apply the technical knowledge in real industrial situations
CO-3: Promote academic, professional and/or personal development
CO-4: Demonstrate effective communication skills through oral presentation
CO-5: Engage in effective written communication through internship report

COURSE OUTLINE:

- A student shall take up 01 credit summer internship in an industry/research organization/institution during the summer vacation after fourth semester (II year II semester) of the B.Tech. programme.
- Internship shall be carried out for a minimum period of 02 weeks and maximum of 04 weeks.
- Evaluation of the Internship shall be done by a review committee consisting of the Head of the Department, faculty supervisor and a senior faculty member of the department. A student shall submit a detailed report regarding the internship and present it before the review committee for evaluation.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester - CSE, IT	**L**	**T/P/D**	**C**
	0	2	0

(18MN6HS03) GENDER SENSITIZATION

COURSE DESCRIPTION:
This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features a number of exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

ACTIVITIES:
Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.

COURSE OBJECTIVES:
• To sensitize students on issues of gender in contemporary India
• To provide a critical perspective on the socialization of men and women
• To expose the students to debates on the politics and economics of work
• To enable students to reflect critically on gender violence
• To expose students to more egalitarian interactions between men and women

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand important issues related to gender in contemporary India
CO-2: Attain a finer grasp of how gender discrimination works in our society and how to counter it
CO-3: Acquire insight into the gendered division of labour and its relation to politics and economics
CO-4: Respond to put an end to gender violence
CO-5: Equipped to work with the other gender treating them as equals

MODULE 1: Introduction to Gender
Definition of Gender
Basic Gender Concepts and Terminology
Exploring Attitudes towards Gender
Social Construction of Gender

MODULE 2: Gender Roles and Relations
Types of Gender Roles
Gender Roles and Relationships Matrix
Gender-based Division and Valuation of Labour

MODULE 3: Gender Development Issues
Identifying Gender Issues
Gender Sensitive Language
Gender, Governance and Sustainable Development
Gender and Human Rights
Gender and Mainstreaming

MODULE 4: Gender-based Violence
The concept of violence
Types of Gender-based violence
The relationship between gender, development and violence
Gender-based violence from a human rights perspective

MODULE 5: Gender and Culture
Gender and Film
Gender and Electronic Media
Gender and Advertisement
Gender and Popular Literature

MODULE 6: Gender and Studies
Knowledge: Through the Lens of Gender Point of View, Gender and the Structure of Knowledge
Whose History: Questions for Historians and Others, Reclaiming a Past, Writing Other Histories

TEXT BOOK:
1. Towards a World of Equals: A Bilingual Textbook on Gender, A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, Telugu Akademi, Telangana Government, 2015

REFERENCES:
1. Sen, Amartya, More than One Million Women are Missing, New York Review of Books 37.20 (20 December 1990). Print.
2. 'We Were Making History' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989
3. Tripti Lahiri, By the Numbers: Where Indian Women Work, Women's Studies Journal (14 November 2012) Available online at: http://blogs.wsj.com/India real time/2012/11/14/by-the-numbers-where-India-women-work/>
4. Abdulali Sohaila I Fought For My Life ...and Won Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
5. K. Kapadia, The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India, London: Zed Books, 2002

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester - CSE, IT

L	T/P/D	C
3	0	3

(18PC1CS07) ARTIFICIAL INTELLIGENCE

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- Understand the major areas and challenges of AI
- Ability to apply basic AI algorithms to solve problems
- Able to describe and apply knowledge representation
- Understand learning approaches with applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply basic concepts of Artificial Intelligence (AI) and use of agents into real world scenario
CO-2: Formulate and solve the complex problems by using various search techniques
CO-3: Choose Knowledge And Rules For Solving The Real-world problems
CO-4: Build Learning And Expert System

UNIT – I:
Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT – II:
Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search, A* search Game Playing: Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

UNIT – III:
Knowledge Representation: Using Predicate logic, representing facts in logic, functions and predicates, Conversion to clause form, Resolution in propositional logic, Resolution in predicate logic, Unification.

UNIT – IV:
Representing Knowledge Using Rules: Procedural Versus Declarative knowledge, Logic Programming, Forward versus Backward Reasoning.

UNIT – V:
Learning: What is learning, Learning by Taking Advice, Learning in Problem-solving, Learning from example: induction, Explanation-based learning.
Introduction to Neural Networks, Different types of Learning in Neural Networks, Applications of Neural Networks, Recurrent Networks.

UNIT – VI:
Expert System: Representing and using Domain Knowledge, Reasoning with knowledge, Expert System Shells-examples, Knowledge acquisition skills-examples.

TEXT BOOKS:
1. Artificial Intelligence A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Pearson Education
2. Artificial Intelligence, Kevin Knight, Elaine Rich, B. Shivashankar Nair, 3rd Edition, 2008
3. Artificial Intelligence, E. Rich and K. Knight, 3rd Edition, TMH

REFERENCES:
1. Expert Systems: Principles and Programming, Giarrantana, Riley, Fourth Edn., Thomson
2. PROLOG Programming for Artificial Intelligence, Ivan Bratka, 3rd Edition, Pearson Education
3. Artificial Intelligence, Patrick Henny Winston, 3rd Edition, Pearson Education
4. Artificial Intelligence, Shivani Goel, Pearson Education
5. Artificial Intelligence and Expert Systems, Patterson, Pearson Education

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester - CSE, IT

L	T/P/D	C
3	0	3

(18PC1CS08) LINUX PROGRAMMING

COURSE OBJECTIVES:
- To understand and make effective use of Linux utilities and shell scripting language to solve problems
- To implement in C some standard Linux utilities like mv, cp, ls etc.
- To Develop the skills the necessary for systems programming including file system programming, process and signal management and interposes communication
- To develop the basic skills required to write network programs using sockets

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understand the basic commands Linux operating system and can write shell Scripts

CO-2: Apply fundamental knowledge create file systems and directories and operate them in Real time scenarios

CO-3: Demonstrate Communication among systems and processes by using system programming and concepts

CO-4: Design client server application to support communication interfaces of Real time scenarios

UNIT – I:
Linux Utilities: File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities, Backup utilities Sed - Scripts, Operations, Addresses, Commands, AWK - Execution, Fields and Records, Scripts, Operations, Actions, Associative Array, Strings and Mathematical functions, System commands in AWK, Applications.

Shell programming with Bourne Again Shell (bash):
Introduction, Shell responsibilities, Pipes and redirection, here documents, Running a shell script, Shell as a programming language, Shell meta characters, File-name substitution, Shell variables, Command substitution, Shell commands, The environment, Quoting, test command, Control structures, Arithmetic in shell, Shell script examples, Interrupt processing functions, Debugging shellscripts

UNIT – II:
Files and Directories: File concepts, File types, File system structure, file metadata - Inodes, kernel support for files, System calls for the file I/O operations- open, create, read, write, close, lseek, dup2, file status information-stat family, file and record locking- fcntl function, file permissions- chmod, fchmod, file ownership-chown, lchown, fchown, links-soft links and hard links- symlink, link, unlink.

Directories: Creating, removing and changing Directories-mkdir, rmdir, chdir, obtaining current working directory-getcwd, directory contents, scanning directories-opendir, readdir, rewind functions.

UNIT – III:
Process: Process concept, Layout of a C program image in main memory, Process environment – environment list, environment variables, getenv, setenv, Kernel support for process, Process identification, Process control - Process creation, replacing a

process image, waiting for process, Process termination, Zombie process, Orphan process, ,system call interface for process management – fork, vfork, exit, wait, waitpid, exec family, process groups, sessions and controlling Terminal, differences between threads and processes.

Signals: Introduction to signals, Signal generation, Signal handling, Kernel support for signals, signal function, Unreliable signals, Reliable signals, Signal functions: kill, raise, alarm, pause, abort, sleep.

UNIT – IV:

Inter Process Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, Pipes-creation, IPC between related processes using FIFOs (Named pipes), differences between unnamed and named pipes, popen and pclose library functions.

UNIT – V:

Message Queues, Semaphores, Shared Memory: Kernel support for messages, APIs for message queues, Client/Server example Semaphores: Kernel support for semaphores, APIs for semaphores, file locking with semaphores. Kernel support for Shared Memory, APIs for Shared Memory, Shared Memory example.

UNIT – VI:

Sockets: Introduction to Berkley Sockets, IPC over a network, client – server model, Socket address structures (Unix domain and internet domain) , Socket system calls for connection oriented protocol and connectionless protocol, example- client/server programs- single server- client connection, multiple simultaneous clients, socket options- setsockopt and fcntl system calls, comparison of IPC mechanisms.

TEXT BOOKS:
1. Unix System Programming using C++, T. Chan, PHI
2. Unix Concepts and Applications, Sumitabha Das, 4th Edition, TMH, 2006
3. Unix and Shell Programming, B. A. Forouzan & R. F. Gilberg, Cengage Learning

REFERENCES:
1. Advanced Programming in the UNIX Environment, W.R. Stevens, 2nd Edition, Pearson Education
2. Unix Network Programming, W. R. Stevens, PHI
3. Unix for Programmers and Users, Graham Glass, King Ables, 3rd Edition, Pearson Education
4. UNIX & Shell Programming, B.M. Harwani, Oxford University Press, ISBN-10: 0198082169 ISBN-13: 978-0198082163
5. Linux System Programming, Robert Love, O'Reilly, SPD

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester - CSE, IT

	L	T/P/D	C
	2	1	3

(18PC1IT07) WEB TECHNOLOGIES

COURSE OBJECTIVES:
- To learn various fundamental concepts for developing websites and web-based applications
- To know about technology for data transportation among incompatible systems and applications
- To write various programs to develop static and dynamic websites
- To implement various frameworks for developing well architected web applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Build static and dynamic web pages with HTML, DHTML, java script and Cascading Styles sheets
CO-2: Analyse and Create XML documents and XML Schema
CO-3: Understand the concepts, analyse and build interactive web applications using servlets, JSP,AJAX and JDBC
CO-4: Apply Various frameworks of web technologies to optimize the applications

UNIT – I:
Introduction to HTML Common Tags: List, Tables, images, forms, Frames
Cascading Style Sheets: CSS Syntax, Set Up Web Pages with CSS, Styling Text, Font, and Properties, Styling Page Backgrounds, Styling Lists in CSS, using CSS Classes and IDs, Using Borders and Height and Width CSS Properties, CSS Pseudo Elements, Positioning Elements, Validating CSS and HTML

UNIT – II:
Java Scripts: Introduction, Objects in Java Script, Dynamic HTML with Java Script.

UNIT – III:
Introduction to XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX, Introduction to AJAX, AJAX XMLHTTP, AJAX Request, AJAX Response, AJAX XML file, AJAX Database.

UNIT – IV:
Web Servers: Tomcat web server, Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.
Servlets: Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax. Servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax. Servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

UNIT – V:
Database Access: Database Programming using JDBC, JDBC drivers, Studying Javax.sql.* package, Accessing a Database from a Servlet.
Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment.

UNIT – VI:

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing: Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations, Accessing a Database from a JSP page, Deploying JAVA Beans in a JSP Page.

TEXT BOOKS:
1. Web Programming, Building Internet Applications, Chris Bates, 2nd Edition, Wiley Dreamtech
2. Core Servlets and Java Server Pages Volume 1: Core Technologies, Marty Hall and Larry Brown Pearson

REFERENCES:
1. Programming World Wide Web, Sebesta, Pearson
2. Internet and World Wide Web – How to program, Dietel and Nieto PHI/Pearson Education Asia
3. Java: The Complete Reference, Herbert Schildt, 7th Edition, TMH

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester - CSE, IT	**L**	**T/P/D**	**C**
	3	0	3

(18PC1CS09) MACHINE LEARNING

COURSE OBJECTIVES:
- To introduce students to the basic concepts and techniques of Machine Learning
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability-based and Generalized learning techniques
- To understand ensemble models of machine learning algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand basics on machine learning and mathematics behind learning algorithms
CO-2: Develop different types of machine learning algorithms
CO-3: Construct a machine learning model
CO-4: Evaluate model accuracy and familiarize with advanced learning algorithms

UNIT – I:
Introduction: Introduction to Machine Learning: Introduction, Different types of learning, Perspectives and Issues in Machine Learning, Parametric and Nonparametric Machine Learning Algorithms, Hypothesis space and inductive bias, Evaluation. Training and test sets, cross validation. Linear Regression: Introduction, Linear Models for Regression.

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, Avoiding Over fitting the Data, Incorporating Continuous-valued Attributes.

UNIT – III:
Instance Based Learning: K nearest neighbor, the Curse of Dimensionality, Overfitting and Underfitting, Feature Selection: forward search, backward search, univariate, multivariate feature selection approach, Dimensionality Reduction, Linear Discriminant Analysis, Principal Component Analysis.

UNIT – IV:
Probability and Bayes Learning: Brute-Force Bayes Concept Learning, Maximum Likelihood Hypothesis, Naïve Bayes Classifier, Logistic Regression, Support Vector Machine: Introduction, the Dual formulation, Maximum margin with noise, nonlinear SVM and Kernel function, Beyond Binary Classification.

UNIT – V:
Artificial Neural Networks: Introduction, Biological motivation, ANN representation, appropriate problem for ANN learning, Perceptron, multilayer networks and the back propagation algorithm, Convergence and local minima and Hidden layer representation in back propagation, Recurrent neural networks.

UNIT – VI:
Evaluating Machine Learning algorithms and Model Selection, Ensemble Learning:
Introduction, Bagging and boosting, Random forest. Clustering: Introduction, K-mean clustering, K-medoids clustering, Hierarchical clustering -Agglomerative clustering - Divisive clustering - Choosing the number of clusters.

TEXT BOOKS:
1. Machine Learning, Tom M. Mitchell, McGraw-Hill
2. Machine Learning: A Probabilistic Perspective, Kevin Murphy, MIT Press, 2012
3. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 2007

REFERENCES:
1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Machine Learning: The Art and Science of Algorithms That Make Sense of Data, Peter Flash, Cambridge, University Press
3. The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer, 2009

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B.Tech. VI Semester - CSE, IT	L	T/P/D	C
	3	0	3

(18PE1IT04) SOFTWARE TESTING METHODOLOGIES

COURSE OBJECTIVES:
- To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods
- To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing
- To understand the software testing methodologies such as flow graphs and path testing, transaction flows testing, data flow testing, domain testing and logic base testing
- Identify the techniques and skills on how to use modern software testing tools to support software testing projects

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Know the basic concepts of software testing and its essentials
CO-2: Able to identify the various bugs and correcting them after knowing the consequences of the bug
CO-3: Able to test a domain or an application and identifying the nice and ugly domains
CO-4: Apply appropriate software testing tools, techniques and methods for even more effective systems during both the test planning and test execution phases of a software development project

UNIT – I:
Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.
Flow Graphs and Path Testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT – II:
Transaction Flow Testing: Transaction flows, transaction flow testing techniques.
Dataflow Testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT – III:
Domain Testing: Domains and paths, Nice and ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT – IV:
Paths, Path Products and Regular Expressions: Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
Logic Based Testing: Overview, decision tables, path expressions, k v charts, specifications.

UNIT – V:
State, State Graphs and Transition Testing: State graphs, good and bad state graphs, state testing, Testability tips.

UNIT – VI:
Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.
Usage of JMeter and Win runner tools for functional / Regression testing, creation of test script for unattended testing, synchronization of test case, Rapid testing, Performance testing of a data base application and HTTP connection for website access.

TEXT BOOKS:
1. Software Testing Techniques, Boris Beizer, Dreamtech, 2nd Edition
2. Software Testing Tools, Dr. K. V. K. K. Prasad, Dreamtech

REFERENCES:
1. The Craft of Software Testing, Brian Marwick, Pearson Education
2. Software Testing, P. C. Jorgenson, 3rd Edition, Aurbach Publications (Dist.by SPD)
3. Software Testing, N. Chauhan, Oxford University Press
4. Introduction to Software Testing, P. Ammann, J. Offutt, Cambridge University Press
5. Effective Methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester - CSE, IT	L	T/P/D	C
	3	0	3

(18PE1CS03) SOFT COMPUTING

COURSE OBJECTIVES:
- Familiarize with soft computing concepts
- Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
- Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
- Learn the concepts of Genetic algorithm and its applications
- Acquire the knowledge of Rough Sets

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
CO-2: Understand fuzzy logic and reasoning to handle and solve engineering problems
CO-3: Apply the Classification and clustering techniques on various applications
CO-4: Build Various Operations Of Genetic Algorithms, Rough Sets

UNIT – I:
Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT – II:
Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT – III:
Fuzzy Decision Making, Particle Swarm Optimization.

UNIT – IV:
Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT – V:
Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix.

UNIT -VI:
Integration of Soft Computing Techniques, applications and case studies.

TEXT BOOKS:
1. Soft Computing – Advances and Applications, B. K. Tripathy and J. Anuradha, Cengage Learning, 2015
2. Principles of Soft Computing, S. N. Sivanandam & S. N. Deepa, 2nd Edition, Wiley India, 2008

3. Neuro-Fuzzy and Soft Computing, J. S. R. Jang, C. T. Sun and E. Mizutani, Pearson Education, 2004

REFERENCES:
1. Fuzzy Sets & Fuzzy Logic, G. J. Klir & B. Yuan, PHI, 1995
2. An Introduction to Genetic Algorithm, Melanie Mitchell, PHI, 1998
3. Fuzzy Logic with Engineering Applications, Timothy J. Ross, McGraw-Hill International Edition, 1995
4. Genetic Algorithms-In Search, Optimization and Machine Learning, David E. Goldberg, Pearson Education

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	3	**0**	**3**

(18PE1IT05) CLOUD COMPUTING

COURSE OBJECTIVES:
- Understand the Virtualization paradigms
- Learn the Cloud Computing fundamentals and its importance to various organizations
- Analyze the concepts of IaaS, PaaS, SaaS, Public and Private Clouds
- Develop applications in cloud security

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the main concepts, key technologies, strengths, and limitations of virtualization and cloud computing and the possible applications for state-of-the-art cloud computing
CO-2: Describe the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc
CO-3: Analyze the core issues of cloud computing such as security, privacy, and interoperability
CO-4: Identify problems, analyze, and evaluate various cloud computing solutions

UNIT – I:
Introduction:
Evolution of Distributed Computing: Scalable computing over the Internet – Technologies for network-based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards- Elements of Grid – Overview of Grid Architecture

UNIT – II:
Grid Services: Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

UNIT – III:
Virtualization: Introduction to Virtualization: Objectives of virtualization, history of virtualization, benefits of virtualized technology, the virtual service desk, what can be virtualized, related forms of computing, cloud computing, software as a service – SaaS, grid computing, utility computing, virtualization processes.

UNIT – IV:
Virtualization Technologies: Ubuntu (server edition), altiris, windows, server, software virtualization, vmware, intel virtualization, red hat virtualization, softgrid application, Linux virtualization, desktop virtualization, hardware virtualization, resource virtualization, processor virtualization, application virtualization.

UNIT – V:

Programming Model: Open-source grid middleware packages – Globus Toolkit (GT4) Architecture, Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT – VI:

Security: Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TEXT BOOKS:

1. Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet, Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, 1st Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012
2. Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guidebook, Ivanka Menken, Gerard Blokdijk, 2009
3. Distributed Applications in the Clou, Jason Venner, Pro Hadoop- Build Scalable, A Press, 2009

REFERENCES:

1. Introduction to Grid Computing, Bart Jacob (Editor), IBM Red Books, Vervante, 2005
2. The Grid: Blueprint for a New Computing Infrastructure‖, by Ian Foster, Carl Kesselman, 2nd Edition, Morgan Kaufmann
3. Introduction to Grid Computing, Frederic Magoules and Jie Pan, CRC Press, 2009
4. A Networking Approach to Grid Computing, Daniel Minoli, John Wiley Publication, 2005
5. Grid Computing: Techniques and Applications, Barry Wilkinson

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B.Tech. VI Semester - CSE, IT

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	3	0	3

(18PE1IT06) ADVANCED OPERATING SYSTEMS

COURSE OBJECTIVES:
- To study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open-source operating systems)
- Hardware and software features that support these systems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the design approaches of advanced operating systems
CO-2: Analyze the design issues of distributed operating systems
CO-3: Evaluate design issues of multi-processor operating systems
CO-4: Identify the requirements Distributed File System and Distributed Shared Memory
CO-5: Formulate the solutions to schedule the real time applications

UNIT – I:
Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives. Theoretical Foundations: Inherent Limitations of a Distributed System, Lamport's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT – II:
Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, Non-Token –Based Algorithms: Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm, Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm, Raymond's Heuristic Algorithm.

UNIT – III:
Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

UNIT – IV:
Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization , Processor Scheduling.
Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

UNIT – V:
Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration

UNIT – VI:

Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOKS:

1. Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, Tata McGraw-Hill Edition, 2001

REFERENCES:

1. Distributed Systems, Andrew S. Tanenbaum, Maarten Van Steen, Edition – 2, Pearson Prentice Hall, 2007

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B.Tech. VI Semester - CSE, IT	L	T/P/D	C
	3	0	3

(18PE1CS09) ANDROID APPLICATION DEVELOPMENT

COURSE OBJECTIVES:
- Describe the essentials of mobile apps development
- Examine and illustrate J2ME, Android and SQLite databases in relevance to Mobile applications
- Understand how Android applications work, manifest, Intents, and using external resources
- Learn to develop applications for current and emerging mobile computing devices

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Describe the Mobility landscape
CO-2: Identify Mobile apps development aspects
CO-3: Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications
CO-4: Summarize and Compose Testing, Signing, Packaging and Distribution of mobile apps

UNIT – I:
Introduction to Mobile: A brief history of Mobile, The Mobile Ecosystem, Why Mobile, Types of Mobile Applications, Mobile Information Architecture, Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

UNIT – II:
Introduction to Android: History of Mobile Software Development, The Open Handset Alliance, Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT – III:
Introduction to Android SDK: The Android Platform, Android SDK, Eclipse Installation, Android Installation, installation of Android Studio, working with android studio, Building a Sample Android application

UNIT – IV:
Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, Working with different types of resources

UNIT – V:

Android User Interface Design: Essentials User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation, Using Android Data and Storage APIs, Sharing Data between Applications with Content Providers, managing data using SQLite.

UNIT – VI:

Using Common Android APIs: Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World. Packaging and deployment – Interaction with server-side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

TEXT BOOKS:

1. Android Wireless Application Development, Lauren Darcey and Shane Conder, 2nd Edition, Pearson Education, 2011
2. Mobile Design and Development, Brian Fling, 1st Edition, O'Reilly, 2009
3. Professional Android 2 Application Development, Reto Meier, Wiley India Pvt. Ltd.

REFERENCES:

1. Beginning Android, Mark L. Murphy, Wiley India Pvt. Ltd.
2. Pro Android, Sayed Y. Hashimi and Satya Komatineni, Wiley India Pvt. Ltd.
3. Teach Yourself Android Application Development In 24 Hours, Edition I, SAMS

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B.Tech. VI Semester - CSE, IT	**L**	**T/P/D**	**C**
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(18PC2IT05) WEB TECHNOLOGIES LABORATORY

COURSE OBJECTIVES:
- Learn various fundamental concepts for developing websites and web-based applications
- Know about the technology for data transportation among incompatible systems and applications
- Develop static and dynamic websites
- Implement various client side and server-side scripting technologies for developing web applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the concepts, analyze and design static and dynamic web pages with HTML, DHTML, java script and Cascading Styles sheets
CO-2: Create, validate and display XML documents
CO-3: Analyze and Build dynamic and interactive web applications using servlets, jsps and JDBC
CO-4: Design and develop web applications with JSP concepts

WEEK 1
Design the following static web pages required for an online bookstore web site.
1)   HOME PAGE:
The static home page must contain three frames.
Top frame : Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
Left frame : At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame.
Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

Logo	Web Site Name			
Hom e	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

Fig 1.1

2)   LOGIN PAGE:
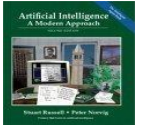This page looks like below:

	Web Site Name
Logo	

Home	Login	Registration	Catalogue	Cart
CSE				
ECE		Login :		
EEE		Password:		
CIVIL		Submit	Reset	

3)   CATOLOGUE PAGE:
The catalogue page should contain the details of all the books available in the web site in a tabular format.
The details should contain the following:
1.   Snap shot of Cover Page.
2.   Book Title, Author Name, Publisher.
3.   Price.
4.   Add to cart button.

5.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	 	Book : XML Bible Author : Winston Publication : Wiely Book : AI Author : S.Russel Publication : Princeton hall Book : Java 2 Author : Watson Publication : BPB publications	$ 40.5 $ 63 $ 35.5	

Logo		Book : HTML in 24 hours	$ 50	Add to cart
		Author : Sam Peter		
		Publication : Sam publication		

WEEK 2

4)   CART PAGE:

The cart page contains the details about the books which are added to the cart. The cart page should look like this:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
IT				
CSE	Book name	Price	Quantity	
ECE	Amount			
EEE				
CIVIL	Java 2 $70	$35.5	2	
	XML bible $40.5	$40.5	1	
		Total amount - $130.5		

5)   REGISTRATION PAGE:

Create a "registration form "with the following fields

1)   Name (Text field)
2)   Password (password field)
3)   E-mail id (text field)
4)   Phone number (text field)
5)   Sex (radio button)
6)   Date of birth (3 select boxes)
7)   Languages known (check boxes – English, Telugu, Hindi, Tamil)
8)   Address (text area)

WEEK 3

VALIDATION:

a)   Write JavaScript to validate the following fields of the above registration page.

1.   Name (Name should contains only alphabets and the length should not be less than 6 characters).

2.   Password (Password should not be less than 6 characters length).

3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
4. Phone number (Phone number should contain 10 digits only).
b) Write JavaScript to validate the above login page with the above parameters.

WEEK 4
Design a web page using CSS (Cascading Style Sheets) which includes the following:
1) Use different font, styles:

In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles. For example:

```
<HTML>
<HEAD>

BODY {background-image:url(myimage.gif);}

<style type="text/css">
B.headline {color:red; font-size:22px; font-family:arial; text-
decoration:underline}
</style>
</HEAD>
<BODY>
<b>This is normal bold</b><br>
<b class="headline">This is headline style bold</b>
```

2) Set a background image for both the page and single elements on the page. You can define the background image for the page like this:

3) Control the repetition of the image with the background-repeat property.
As background-repeat: repeat
Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.

4) Define styles for links as
   A:link
   A:visited
   A:active
   A:hover

   Example:
   <style type="text/css">
   A:link {text-decoration: none}
   A:visited {text-decoration: none}
   A:active {text-decoration: none}
   A:hover {text-decoration: underline; color: red;}
   </style>

5) Work with layers:
   For example:
   LAYER 1 ON TOP:
   <div style="position:relative; font-size:50px; z-index:2;">LAYER 1</div>
   <div style="position:relative; top:-50; left:5; color:red; font-size:80px; z-index:1">LAYER 2</div>

   LAYER 2 ON TOP:
   <div style="position:relative; font-size:50px; z-index:3;">LAYER 1</div>
   <div style="position:relative; top:-50; left:5; color:red; font-size:80px; z-index:4">LAYER 2</div>

6)   Add a customized cursor: Selector {cursor:value}
For example:

```
<html>
<head>
<style type="text/css">
.xlink {cursor:crosshair}
.hlink{cursor:help}
</style>
</head>
<body>
<b>
<a href="mypage.htm" class="xlink">CROSS LINK</a>
<br>
<a href="mypage.htm" class="hlink">HELP LINK</a>
</b>
</body>
</html>
```

WEEK 5

Write an XML file which will display the Book information which includes the following:
1)   Title of the book
2)   Author Name
3)   ISBN number
4)   Publisher name
5)   Edition
6)   Price
Write a Document Type Definition (DTD) to validate the above XML file. Display the XML file as follows.

The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns.
Use XML schemas XSL and CSS for the above purpose.
Note: Give at least for 4 books. It should be valid syntactically. Hint: You can use some xml editors like XML-spy

WEEK 6
Install TOMCAT web server.
While installation assign port number 8000 to TOMCAT. Make sure that these ports are available i.e., no other process is using this port.
Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.
Access the pages by using the urls: http://localhost:8000/vnr/books.html

WEEK 7
User Authentication: Assume four users user1, user2, user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a servlet for doing the following.
I.   Create a Cookie and add these four user id's and passwords to this Cookie.
II.   Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
☐   If he is a valid user (i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ".
☐   Use init-parameters to do this. Store the user-names and passwords in the web.xml and access them in the servlet by using the getInitParameters() method.

WEEK 8
CREATE TABLE Students (student-id, student-name, course, branch, year, studentemailid);
Faculty(faculty_id,facultyname,studentid,studentname,course,year,facultyemailid)

I.   Write a servlet program to retrieve the names of the student who study a particular course.
II.   Write a servlet program to retrieve the names of the student who study a particular course and year.
III.   Write a servlet program to retrieve the names of the student,course,branch,year who study under a particular faculty.(Note the Input is provided from the HTML form).

WEEK 9
Write a servlet program which does the following job: Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits
the login form using the user name and password from the database.

WEEK 10
Create a table with attributes (emp_id ,emp_name , job_name , joining_date, salary , department)

I.   Write a JSP program to display the names of the employee, empid, salary and department joined after the given input joining date(The input joining date must be given from the HTML form)

II.   Write a JSP program to display the names of the employee with empid, salary, department and the number of days worked from their joining date to till date.

WEEK 11

Create a table book (book_id, booktitle, author, price)

I.   Write a JSP program to insert the data to the mysql database from the HTML form.

II.   Write a JSP program to retrieve the data from the table book given the name of the author. If author is not found, your program must display no author is found.

III.   Write a JSP program to retrieve different authors of the same book given the title of the book in the HTML form.

WEEK 12

Develop VNRVJIET web portal to promote college heritage in terms of Technical Fests, Departments, Facilities and Training & Placement.

TEXT BOOKS:

1. Web Programming, Building Internet Applications, Chris Bates, 2nd Edition, Wiley Dreamtech
2. Core Servlets and Java Server Pages Volume 1: Core Technologies, Marty Hall and Larry Brown, Pearson

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B.Tech. VI Semester - CSE, IT

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(18PC2CS05) MACHINE LEARNING USING PYTHON LABORATORY

COURSE OBJECTIVE:
- To get an overview of the various machine learning techniques and able to demonstrate them using python

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand various machine learning algorithms and their complexity
CO-2: Apply the appropriate machine learning strategy for any given real-world problem
CO-3: Analyse the model generated from data to evaluate its accuracy
CO-4: Implement the model with optimized accuracy

LIST OF EXPERIMENTS:

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans:15%)
2. Extract the data from database using python
3. Implement k-nearest neighbors classification using python
4. Implement decision tree algorithm using python.

5. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3centroids)

VAR1 VAR2 CLASS

1.713 1.586 0
0.180 1.786 1
0.353 1.240 1
0.940 1.566 0
1.486 0.759 1
1.266 1.106 0
1.540 0.419 1
0.459 1.799 1
0.773 0.186 1

6. The following training examples map descriptions of individuals onto high, medium and low credit- worthiness.

mediumskiing design   single twenties no ->highRisk high golftrading   married
forties yes ->lowRisk low   speedway transport married thirties yes ->medRisk medium
footballbanking
single thirties yes ->lowRisk high flying media married fifties yes -

>highRisk low footballsecurity single twenties no ->medRisk
mediumgolf mediasingle thirties yes ->medRisk medium golf
transport married forties yes ->lowRisk high skiing banking single thirties yes ->highRisk
low   golf   unemployed married forties yes -
>highRisk
Input attributes are (from left to right) income, recreation, job, status, age-group, home- owner. Find the unconditional probability of `golf' and the conditional probability of
`single' given `medRisk' in the dataset?

7. Implement linear regression using python.
8. Implement Naïve Bayes theorem to classify the English text
9. Implement an algorithm to demonstrate the significance of genetic algorithm
10. Implement the finite words classification system using Back-propagation algorithm

TEXT BOOKS:
1. Machine Learning, Tom M. Mitchell, McGraw-Hill
2. A Complete Introduction to the Python Language, Mark Summer Field, 2nd Edition
3. Python The Complete Reference, Martin C. Brown, Brandon A. Nordin

REFERENCES:
1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

OPEN ELECTIVE COURSES

SMART CITIES

SMART CITIES

In the twenty-first century, engineers are being tasked with solving ever more complex and subtle societal challenges – from climate change to unprecedented urbanisation that is materially affecting the lives of many urban populations. As engineers become ever more interdisciplinary and the boundaries of disciplines soften, they need to reflect as a community as to the appropriateness of the engineering paradigm to address these needs. Currently the engineering community is pointing to the digital technologies and the 'smart city' as a deliverer of efficiency and resilience without fully acknowledging the intricate socio-political context in which it is situated.

The domain of EIE was developed to modernise and automate these operations using the technological advancements in the realm of electronics. Even outside the industry, common household appliances — such as washing machine, air-conditioner, geyser, and microwave oven — cannot attract customers without features such as auto cut-off after certain time or temperature, which is again an example of instrumentation. The field of Instrumentation Engineering is also core to the recent advances such as smart home appliances, smart cities and automobiles. It is thus not far from the truth to claim that the fourth industrial revolution.

The world population is continuously growing and reached a significant evolution of the society, where the number of people living in cities surpassed the number of people in rural areas. This puts national and local governments under pressure because the limited resources, such as water, electricity, and transports, must thus be optimized to cover the needs of the citizens. Therefore, different tools, from sensors to processes, service, and artificial intelligence, are used to coordinate the usage of infrastructures and assets of the cities to build the so-called smart cities.

Different definitions and theoretical models of smart cities are given in literature. However, smart city can usually be modelled by a layered architecture, where communication and networking layer plays a central role. In fact, smart city applications lay on collecting field data from different infrastructures and assets, processing these data, taking some intelligent control actions, and sharing information in a secure way. Thus, a two-way reliable communications layer is the basis of smart cities. This chapter introduces the basic concepts of this field and focuses on the role of communication technologies in smart cities. Potential technologies for smart cities are discussed, especially the recent wireless technologies adapted to smart city requirements.

What is the concept of a smart city?

There is no universally accepted definition for a smart city because people can interpret different meanings for it. Hence, it means different things to different people. Here, you will get a basic definition that captures the essence of what a smart city is and what it does. While the concept varies from area to area depending on the resources, the basic idea behind it remains the same. A smart city aims to bring various components together to live harmoniously and attempts to do with the least environmental damage or impact. In other words, a smart city is a place with high standards of living, which survives and thrives on eco-friendly means. The size and

amenities within a smart city vary according to geography, resources available, geopolitical scenario and investment received.

Growth in Global population continues to drive citizens from rural areas to cities. With rapid expansion of urban areas, cities need to become intelligent to handle this large scale urbanization. This is driving city operators to look at smarter ways to manage complexities, increase efficiencies and improve quality of life. Today we need cities that monitor& integrate infrastructure to better optimize resources while maximizing service to its citizens. So to meet all the needs we need our cities to be smarter which brings a concept "**Smart cities**" Smart cities optimize the use of technology in the design & operation of infrastructure and buildings in such a way which meets the current and future needs of their citizens. To be truly smart they also require consideration of governance &growth, urban development and infrastructure, the environment & natural resources, society and community.

Smart city programs provide a range of technologies that can be applied to solve infrastructure problems associated with ageing infrastructure and increasing demands. The potential for infrastructure and urban improvement remains unrealized, however, due to technical, financial, and social constraints and criticisms that limit the implementation of smart cities concepts for infrastructure management. The discussion presented here provides a review of smart technologies including sensors, crowdsourcing and citizen science, actuators, data transmission, Internet of Things, big data analytics, data visualization, and blockchain, which can be used for infrastructure management. Smart infrastructure programs are reviewed to explore how enabling technologies have been applied across civil engineering domains, including transportation systems, water systems, air quality, energy infrastructure, solid waste management, construction engineering and management, structures, and geotechnical systems.

Making cities "smarter" by efficient management of resources and infrastructure, greener environment, and smart governance resulting in a better quality of living of its citizens. This can be enabled by the effective use of information and communication technologies (ICTs) tools, which have the ability to provide eco-friendly and economically viable solutions for cities.

Setting up a smart city is more than improving the old system with technology by simply adding sensors, remote supervision, and control to essential city services. It should be a complete shift of a paradigm in daily life when using new technologies, especially new ICT leading to smart outcomes.

Smart solutions

Another important feature of smart cities is that they will provide smart solutions to modern problems. These include:

- Public information systems
- Redressal of grievances
- Electronic service delivery
- Maximum engagement of citizens
- Reduced energy and fuel usage
- Reduces the development of wastes
- Smart water monitoring
- Treatment of wastewater
- Sustainable monitoring water quality
- Maximum utilization of renewable energy sources
- Usage of green building techniques
- Smart parking to reduce clutter
- Intelligent traffic management system.

Advantages of a smart cities,

1. Promotion of mixed land usage resulting in higher efficiency and reduced wastage of land.
2. Expanded housing opportunities.
3. Reduced congestion, air pollution and resource depletion.
4. Helps to boost local economies by promoting localized trade and interactions.
5. Efficient use of public transport to reduce fuel wastage.
6. Safe and secure localities.
7. Preservation of open spaces.
8. Reduction in urban heating.
9. Promotion of transit-oriented development.
10. Making governance more people-friendly and cost-effective.

Here's a look at some projects that have taken inspiration from the concepts used for the design of smart cities. These projects will help you build energy-efficient systems that will help heal the world.

1. **Home Automation using IoT**
2. **Smart Irrigation System**
3. **Smart Building using IoT**
4. **Smart Energy Meter using GSM**
5. **Solar and Smart Energy Systems**
6. **Smart Water Monitoring**
7. **Automated Street Lighting**
8. **Automated Railway Crossing**
9. **Intelligent Transportation Systems**
10. **Smart Sewage Maintenance Systems.**
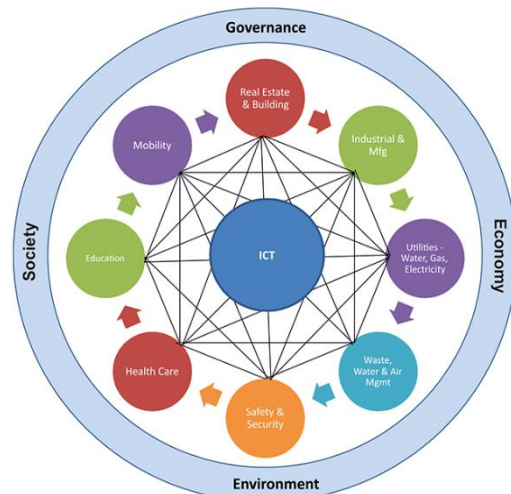
To develop new smart cities and to transform our cities into smart cities the engineers in particular are stepping up as leaders.

Civil & Environmental Engineers are working to harness the potential of latest technologies and data for our urban infrastructure, which is among the most complex system in the world. They provide sustainable, resilient and advanced means of

transportation system, green building, better water management system and better waste management system. This not only develop physical infrastructure but also develop institutional & social infrastructure that enable our societies to function. Modelling these systems of systems will require managing data at an unprecedented scale.

To support them Computer and **Electronics & Communication Engineers** help in creating future cities that are digital, build and operate cities ICT landscape across application and infrastructure like IOT (Internet of Things), e-payment, e-market, the latest communication devices etc which is leveraging next generation technologies. They create a platform for conveyance of different city services, leverage big data analytics to manage city performance and proactive crisis management.

Electrical Engineers developing new renewable source of energy to meet ever increasing power demands. They also develop methods of effective power transmission with minimum losses which is more economical and safer. They also work on developing microchips to micro sensors which are helping in making our households, institution efficient and safer.

Conclusion

It is clear that dreaming of a smart city without active contribution of engineers is a myth. So, there will always be demand of Engineers and because of which even after crises in the placement scenario still the maximum science students choose Engineering as their first career choice in hope of a better future.

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B.Tech. V Semester
	L	T/P/D	C
	3	0	3

(18OE1CE01) SMART CITIES PLANNING AND DEVELOPMENT

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To Introduce students on smart city basic concepts, global standards and Indian context of smart cities
- To understand smart community, smart transportation and smart buildings
- To understand Energy demand, Green approach to meet Energy demand and their capacities
- To identify Smart Transportation Technologies in cities and concepts towards smart city

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Recognize smart city concepts and their international and national standards
CO-2: Recognize smart community, transportation and building concepts
CO-3: Develop and calibrate energy demand and their capacity limits
CO-4: Predict the various smart urban transportation systems and the transition from existing city towards a smart city

UNIT – I:
Introduction to Smart Urban Infrastructures and Smart Cities: Introduction to City Planning - Understanding Smart Cities - Dimensions of Smart Cities - Global Experience of Smart Cities Smart Cities – Global Standards and Performance Benchmarks, Practice Codes -Indian scenario - India "100 Smart Cities" Policy and Mission.

UNIT – II:
Smart Cities Planning and Development: Introduction to Smart Community - Smart community concepts: Concept of Smart Community - Smart Transportation - Smart Building and Home Device - Smart Health - Smart Government - Smart Energy and Water – Cyber Security, Safety, and Privacy - Internet of Things, Blockchain, Artificial Intelligence, Alternate Reality, Virtual Reality.

UNIT – III
Smart Urban Energy Systems – I: Conventional vs. Smart, City components, Energy demand, Green approach to meet Energy demand, Index of Indian cities towards smartness – a statistical analysis -Meeting energy demand through direct and indirect solar resources - Efficiency of indirect solar resources and its utility, Capacity limit for the indirect solar resources - Effectiveness in responsive environment in smart city; Smart communication using green resources.

UNIT – IV:
Smart Urban Energy Systems – II: Introduction to PV technology - PV of various scale for smart city applications - Energy efficiency - Policies of Solar PV in smart domains (RPO, REC, Carbon credit, etc.) Definition - Structure of Smart Grid - Indian Perspective

- Advantage & limitation - Definition, Structure of Smart Grid- Indian Perspective-Advantage & limitation.

UNIT – V:
Smart Urban Transportation Systems: Smart Transportation Technologies - Driverless and connected vehicles - ride sharing solutions - The "improve" pathway - The "shift" pathway – Smart Roads and Pavement systems.

UNIT – VI:
Towards Smart Cities: The transition of legacy cities to Smart -. Right transition process - the benefit of citizens, cities to adopt effective management and governance approaches - factors in the transition phase of legacy cities to smart cities and their managerial implications.

TEXT BOOKS:
1. Internet of Things in Smart Technologies for Sustainable Urban Development,G. R. Kanagachidambaresan, R. Maheswar, V. Manikandan, K. Ramakrishnan, Springer, 2020
2. Society 5.0: A People-centric Super-smart Society, Hitachi-UTokyo Laboratory (H-UTokyo Lab), Springer, 2020
3. The Routledge Companion to Smart Cities, Katharine S. Willis, Alessandro Aurigi, Routledge International Handbooks, 2020

REFERENCES:
1. Smart Cities in Asia: Governing Development in the Era of Hyper-Connectivity Yu-min Joo, Yu-Min Joo, Teck-Boon Tan, Edward Elgar Pub, 2020
2. Urban Systems Design: Creating Sustainable Smart Cities in the Internet of Things Era, Yoshiki Yamagata, Perry P. J. Yang, Elsevier, 2020
3. Smart Cities and Artificial Intelligence: Convergent Systems for Planning, Design, and Operations, Christopher Grant Kirwan, Zhiyong Fu, Elsevier, 2020

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester	L	T/P/D	C
	3	0	3

(18OE1CE02) GREEN BUILDING TECHNOLOGY

COURSE PRE-REQUISITES: Smart Cities Planning and Development

COURSE OBJECTIVES:
- To expose the students to green buildings, their features and importance in the present context of sustainable development
- To introduce various sustainable building materials for green buildings
- To acquire knowledge on various design concepts and construction aspects of green buildings
- To learn the various policies and incentives for green buildings and also different green building rating systems and codes

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain the importance, features and requisites of a green building
CO-2: Identify suitable sustainable building materials for construction of green building
CO-3: Plan and design various systems for green buildings
CO-4: Explain various codal provisions of green buildings and accordingly rate a building

UNIT – I:
Introduction: Definition of Green Buildings - Typical features of green buildings - Benefits of Green Buildings - Green Building Materials and Equipment in India - Key Requisites for Constructing a Green Building - Important Sustainable features for Green Building - Climate responsive buildings - Carbon footprint and eco footprints of buildings.

UNIT – II:
Green Building Materials: Introduction to sustainable building materials – Sustainable Concrete – Partial replacements in concrete - Natural building materials - Bio materials - Mycelium - Engineered Wood - Structural insulated panels (SIPs) - Natural Fiber - Nontoxic materials: low VOC paints, organic paints, coating and adhesives - Use of waste materials such as paper, Cellulose, glass bottles, tires, shipping containers - Use of industrial waste such as fly-ash, bags, building demolition waste.

UNIT – III:
Design of Green Buildings: Indoor environmental quality requirement and management: Thermal comfort - HVAC - Visual perception - Illumination requirement - Auditory requirement – Energy Efficiency - Lighting and day lighting - Steady and non-steady heat transfer through the glazed window and the wall – Indoor air quality - Local climatic conditions – temperature, humidity, wind speed and direction.

UNIT – IV:
Construction of Green Buildings: IoT Integrated Automated Building Systems - Synthetic Roof Underlayment - Green Roofs - Grid Hybrid System - Passive Solar - Greywater Plumbing Systems - Electrochromic Glass - Solar Thermal Cladding - Structural 3D Printing - Self-healing Concrete - Bird Friendly Design - Landscaping for Parking Lot Runoff - Composting Toilets - Proactive Maintenance - Green Cleaning.

UNIT – V:
Green Building Policies and Incentives: Green products and material certification - parameters making products green - products transparency movement - Cradle to cradle certification - Product emission testing - Carbon trust - carbon credit - returns on investments - savings Policies towards electrical power in India – Case study - Tax credits & Grants - Green construction guide.

UNIT – VI:
Green Building Rating Systems and Codes: Green building rating systems: BREAM, LEED and GRIHA, ISO 14020 – Green building codes: ECBC and NBC 2016 - Green materials: Standard specifications – Case Studies: Dockland Building in Hamburg, SOKA Building in Wiesbaden, KSK Tuebingen, Nycomed, Constance, DR Byen, Copenhagen.

TEXT BOOKS:
1. Green Building Handbook, Tom Woolley and Sam Kimings, 2009
2. Sustainable Construction: Green Building Design and Delivery, Charles J. Kibert, 2012

REFERENCES:
1. Green Building Fundamentals-II, Mike Montoya, Pearson, USA, 2010
2. Sustainable Construction - Green Building Design and Delivery, Charles J. Kibert, John Wiley & Sons, New York, 2008
3. Sustainable Construction and Design-II, Regina Leffers, Pearson / Prentice Hall, USA, 2009
4. Introduction to Environmental Economics, Nick Hanley, Jason F. Shogren and Ben White, Oxford University Press, 2001

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1CE03) SMART MATERIALS AND STRUCTURES

COURSE PRE-REQUISITES: Smart Cities Planning and Development, Green Building Technology

COURSE OBJECTIVES:
- To introduce the students to various smart materials and their working principles
- To learn about various smart sensors, actuators and their application in structural health monitoring
- To acquire knowledge on different smart composite materials and their modelling concepts
- To learn about the advancements in the field of smart structures, materials and their application in engineering domain

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain the different smart materials and their principles
CO-2: Identify suitable smart sensors and actuators for a specific engineering application
CO-3: Explainthe mechanics of smart composite materials
CO-4: Gain the knowledge on smart materials and smart structures

UNIT I:
Overview of Smart Materials: Introduction to Smart Materials, Principles of Piezoelectricity, Perovskyte Piezoceramic Materials, Single Crystals vs Polycrystalline Systems, Piezoelectric Polymers, Principles of Magnetostriction, Rare earth Magnetostrictive materials, Giant Magnetostriction and Magneto-resistance Effect, Introduction to Electro-active Materials, Electronic Materials, Electro-active Polymers, Ionic Polymer Matrix Composite (IPMC), Shape Memory Effect, Shape Memory Alloys, Shape Memory Polymers, Electro-rheological Fluids, Magneto Rheological Fluids

UNIT-II:
High-Band Width, Low Strain Smart Sensors: Piezoelectric Strain Sensors, In-plane and Out-of Plane Sensing, Shear Sensing, Accelerometers, Effect of Electrode Pattern, Active Fibre Sensing, Magnetostrictive Sensing, Villari Effect, Matteuci Effect and Nagoka-Honda Effect, Magnetic Delay Line Sensing, Application of Smart Sensors for Structural Health Monitoring (SHM), System Identification using Smart Sensors

UNIT-III:
Smart Actuators: Modelling Piezoelectric Actuators, Amplified Piezo Actuation – Internal and External Amplifications, Magnetostrictive Actuation, Joule Effect, Wiedemann Effect, Magnetovolume Effect, Magnetostrictive Mini Actuators, IPMC and Polymeric Actuators, Shape Memory Actuators, Active Vibration Control, Active Shape Control, Passive Vibration Control, Hybrid Vibration Control

UNIT –IV:

Smart Composites: Review of Composite Materials, Micro and Macro-mechanics, Modelling Laminated Composites based on Classical Laminated Plate Theory, Effect of Shear Deformation, Dynamics of Smart Composite Beam, Governing Equation of Motion, Finite Element Modelling of Smart Composite Beams

UNIT-V:

Advances in Smart Structures & Materials: Self-Sensing Piezoelectric Transducers, Energy Harvesting Materials, Autophagous Materials, Self-Healing Polymers, Intelligent System Design, Emergent System Design

UNIT –VI:

Applications to Engineering Domains – Case studies

TEXT BOOKS:

1. Smart Structures: Analysis and Design, A. V. Srinivasan, D. Michael McFarland, Cambridge University Press, 2000
2. Smart Structures: Physical Behaviour, Mathematical Modelling and Applications, Paolo Gaudenzi, Wiley, 2009

REFERENCES:

1. Smart Structures and Materials, Brian Culshaw, Artech House, 2000
2. Smart Structures, Gauenzi P., Wiley, 2009
3. Piezoelectricity, Cady W. G., Dover Publication

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VIII Semester

	L	T/P/D	C
	3	0	3

(18OE1CE04) INTELLIGENT TRANSPORTATION SYSTEM

COURSE PRE-REQUISITES: Smart Cities Planning and Development, Green Building Technology, Smart Materials and Structures

COURSE OBJECTIVES:
- To understand ITS architecture and standards
- To apply appropriate ITS technology depending upon site specific conditions
- To design and implement ITS components
- To understand concept and application of Automated Highway Systems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Differentiate different ITS user Services
CO-2: Apply ITS for road user safety
CO-3: Interpret importance of AHS in ITS
CO-4: Extend future research and special project

UNIT – I:
Introduction To ITS: System Architecture, Standards, Database – Tracking Database – Commercial Vehicle Operations – Intelligent Vehicle Initiative - Metropolitan ITS – Rural ITS – ITS for Rail network.

UNIT – II:
ITS Travel Management: Autonomous Route Guidance System – Infrastructure based systems – Telecommunications – Vehicle – Roadside communication – Vehicle Positioning System – Electronic Toll Collection – Electronic Car Parking

UNIT – III:
ITS Designs: Modeling and Simulation Techniques - Peer – to – Peer Program – ITS for Road Network – System Design – Mobile Navigation Assistant – Traffic Information Center – Public Safety Program.

UNIT – IV:
Introduction to Automated Highway Systems: Evolution of AHS and Current Vehicle Trends - Vehicles in Platoons – Aerodynamic Benefits - Integration of Automated Highway Systems – System Configurations - Step by Step to an Automated Highway System.

UNIT – V:
Evaluation and Assessment of AHS: Spacing and Capacity for Different AHS Concepts – Communication Technologies for AHS - The Effects of AHS on the Environment – Regional Mobility - Impact Assessment of Highway Automation.

UNIT – VI:
Implementation of ITS: ITS programs globally- overview of ITS in developed countries and developing countries – ITS at Toll Plazas – Parking lots – Highways.

TEXT BOOKS:

1. Intelligent Transport Systems Handbook 2000: Recommendations for World Road Association (PIARC), Kan Paul Chen, John Miles
2. Intelligent Transport Systems – Cases and Policies, Roger R. Stough, Edward Elgar, 2001
3. Intermodal Freight Transport, David Lowe, Elsevier Butterworth-Heinemann Publishers, 2005

REFERENCES:

1. Positioning Systems in Intelligent Transportation Systems, Chris Drane and Chris Rizos, Artech House Publishers, London, 2000
2. Perspectives on Intelligent Transport Systems, Joseph M. Sussman, Springer Publishers, 2000
3. Intelligent Transport System, Intelligent Transportation Primer, Washington, US, 2001

WASTE MANAGEMENT

WASTE MANAGEMENT

The courses such as solid waste management (SWM), hazardous waste management (HWM), waste to energy (WTE) and intelligent waste management and recycling system (IWM&RS) are the courses available in the waste management track stream which having a potential syllabus content to meet out the industrial and research needs.

Solid waste management is an interesting track course which actual highlights the day-to-day problems where everybody is facing due to the improper management of industrial, domestic and household waste. Further, the enthusiastic aspects involved in the track courses such as: awareness on its impact over on environment, formal or scientific way of handling and management of waste and disposal scenarios.

In hazardous waste management course, handling and management of nuclear waste at national and international level have been highlighted. Further, the content enlightens about the legal process of state, central and industrial responses toward any emergency situations arise by hazardous waste. Finally, it deals about natural resource damage assessment and restoration.

Waste to energy is a pioneering course available in the track; it is one of the interesting and mindboggling course in the track which highlights the importance of converting the waste materials into wealth. It gives enough space to understand the basic process technologies in a theoretical and industrial way such as: thermal, chemical and biological conversion process. From the above, biological conversion process is in its embryonic state and having potential to expands its technological wings in the near future and having enormous scope of industrial applications where students can be benefited. Finally, conversion devices is an innovative module have been framed to explore the young minds in the line of designing and creating a demand based conversion device products which even lays an entrepreneurial pathway to them.

First of its kind, even at both international and national level a dedicated and extensive course for intelligent waste management and recycling system have been framed with conventional and advanced modules. It is really an interesting course where a student can apply his/her innovative creations to solve the existing and futuristic problems in a smart way with the help of smart tools. Optimistic modules such as: life cycle assessment and carbon-footprint-based IWMS, principles of systems engineering and regulatory frameworks have been incorporated to meet out the international requirements.

In the pathway of exploring the fundamentals and basic knowledges about the course, the six units of all the courses have been formulated keeping in the mind that the students can be able to competitive among the international community at the end of semester. In this context, comprehensive theoretical and industrial processes have been incorporated in each and every module of courses. Further, it is highly believed that the framed syllabus modules having 100% industrial applications which can make the students to feel motivated, satisfied and confidence to compete with the international community.

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B.Tech. V Semester	L	T/P/D	C
	3	0	3

(18OE1CE05) SOLID WASTE MANAGEMENT

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the concepts of solid waste management
- To remember the characteristics of solid waste and source reduction techniques
- To acquire the knowledge & skills in the collection, storage, transport and engineering principles of solid waste
- To remember and understand the treatment, disposal and recycling and various laws and regulation of solid waste management

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the fundamental concepts of solid waste management
CO-2: Apply the acquired knowledge to resolve the practical problems on source reduction
CO-3: Apply the knowledge on collection, storage, transport and waste processing of solid waste in real time situation
CO-4: Impart the gained knowledge and skills and various laws & regulations on treatment of SW in real time societal problems

UNIT – I:
Sources and Classification: Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management – Elements of integrated waste management and roles of stakeholders - Financing and Public Private Participation for waste management- Integrated solid waste management.

UNIT – II:
Waste Characterization and Source Reduction: Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Extended producer responsibility - Recycling and reuse.

UNIT – III:
Storage, Collection and Transport of Wastes: Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport.

UNIT – IV:
Waste Processing Technologies: Objectives of waste processing – material separation and processing technologies – biological and chemical conversion technologies – methods and controls of Composting - thermal conversion technologies and energy recovery – incineration – solidification and stabilization of hazardous wastes-

treatment of biomedical wastes - Health considerations in the context of operation of facilities.

UNIT – V:
Waste Disposal: Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – Rehabilitation of open dumps-remediation of contaminated sites.

UNIT – VI:
Regulatory Frameworks: Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, nuclear wastes - lead acid batteries, electronic wastes, plastics waste, bio-medical waste, construction and demolition waste and fly ash waste.

TEXT BOOKS:
1. Integrated Solid Waste Management, George Tchobanoglous, Hilary Theisen and Samuel A., Vigil, McGraw-Hill International Edition, New York, 1993
2. CPHEEO, Manual on Municipal Solid Waste Management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2014

REFERENCES:
1. Handbook of Solid Waste Management, Frank Kreith, George Tchobanoglous, McGraw-Hill, 2002
2. Waste Management Practices, John Pitchtel, CRC Press, Taylor and Francis Group, 2014
3. Municipal Solid Waste Management, Processing, Energy Recovery, Global Examples, P. Jayarama Reddy, BS Publications, CRC Press, Taylor and Francis Group, 2011
4. GoI, Ministry of Environment and Forest and Climate Change, Various Recent Laws and Rules of Solid Waste Management

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester	L	T/P/D	C
	3	0	3

(18OE1CE06) HAZARDOUS WASTE MANAGEMENT

COURSE PRE-REQUISITES: Solid Waste Management

COURSE OBJECTIVES:
- To understand the concepts of hazardous waste management
- To understand the principle of waste characterization, storage, transport and processing
- To understand the principles of nuclear waste and Hazardous Management (HM) and emergency Response
- To understand the principle and process of landfills and natural resource Damage Assessment & Restoration

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the fundamental concepts of hazardous waste management
CO-2: Apply the knowledge to resolve the problems on storage, transport and processing
CO-3: Apply the knowledge to resolve the practical problems on nuclear waste and HM & emergency response
CO-4: Impart the gained knowledge and skills to resolve the practical problems on landfills and natural resource damage assessment & restoration on field

UNIT – I:
Introduction: Need for hazardous waste management – Sources of hazardous wastes – Effects on community – terminology and classification – Storage and collection of hazardous wastes – Problems in developing countries – Protection of public health and the environment.

UNIT – II:
Waste Characterization, Storage, Transport and Processing: Hazardous Waste Characterization and Definable Properties - Analytical– Analytical methods – Hazardous waste inventory- Source reduction of hazardous wastes - Handling and storage of Hazardous wastes –Waste Compatibility Chart – Hazardous Waste Transport- Manifest system – Transboundary movement of wastes – Basal Convention – Hazardous waste treatment technologies – Physical, chemical and thermal treatment of hazardous waste – Solidification – Chemical fixation – Encapsulation – Incineration.

UNIT – III:
Nuclear Waste: Characteristics – Types – Nuclear waste – Uranium mining and processing – Power reactors – Refinery and fuel fabrication wastes – spent fuel – Management of nuclear wastes – Decommissioning of Nuclear power reactors – Health and environmental effects.

UNIT – IV:

Management of Hazardous Wastes: Identifying a hazardous waste – methods – Quantities of hazardous waste generated – Components of a hazardous waste management plan – Hazardous waste minimization – Disposal practices in Indian Industries – Future challenges - Emergency Response - National Response Team and Regional Response Teams; National Contingency Plan and Regional Contingency Plans; National Response Center; State, Local and Industry Response Systems.

UNIT – V:

Secure Landfills: Hazardous waste landfills – Site selections – landfill design and operation – Regulatory aspects – Liner System- Liners: clay, geomembrane, HDPE, geonet, geotextile – Cover system- Leachate Collection and Management – Environmental Monitoring System- Landfill Closure and post closure care - Underground Injection Wells.

UNIT – VI:

Natural Resource Damage Assessment and Restoration: Natural Resource Damage Assessment Laws and Regulations - Central and State government agencies - Damage Assessment and Restoration Procedures - Groundwater Hydrology and Contamination Processes - Groundwater Contamination Detection, Analysis and Monitoring - Overview of CERCLA - Remedial Action Process and RCRA Correction Action Program - Preliminary Assessments and Site Inspections - Hazard Ranking System - National Priorities List - State Priorities List - Remedial Investigations and Feasibility Studies - Records of Decision and the Administrative Process - Remedial Design - Remedial Action - NPL Deletion Process.

TEXT BOOKS:

1. Hazardous Waste Management, Charles A. Wentz., 2nd Edition, McGraw-Hill International, 1995
2. Standard Handbook of Hazardous Waste Treatment and Disposal, Harry M. Freeman, McGraw-Hill, 1997

REFERENCES:

1. Hazardous Waste (Management and Transboundary Movement) Rules, Ministry of Environment and Forests, Government of India, New Delhi
2. Guidelines and Criteria for Hazardous Waste Landfills and Hazardous Waste Treatment Disposal Facilities, Central Pollution Control Board, New Delhi, 2010
3. Hazardous Waste Management, Prof. Anjaneyulu
4. Hazardous Waste Management, M. LaGrega and others, McGraw-Hill Publication

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VII Semester	L	T/P/D	C
	3	0	3

(18OE1CE07) WASTE TO ENERGY

COURSE PRE-REQUISITES: Solid Waste Management, Hazardous Waste Management

COURSE OBJECTIVES:
* To understand the concepts of energy from waste
* To understand the principle and process of thermal conversion technology (TCT)
* To understand the principle and process of chemical and biological conversion technology (CCT & BCT)
* To understand the principles and processes of biomass energy technology (BET) and conversion process and devices (P&D) for solid wastes

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the fundamental concepts of energy from waste
CO-2: Apply the acquired knowledge to resolve the practical problems on TCT
CO-3: Apply the knowledge to resolve the practical problems on CCT and BCT
CO-4: Impart the gained knowledge and skills to resolve the practical problems on BET and P&D

UNIT – I:
Introduction to Energy from Waste: Classification of waste as fuel – agro based, forest residue, industrial waste, MSW – conversion devices – incinerators, gasifiers, digesters, Environmental monitoring system for land fill gases, Environmental impacts; Measures to mitigate environmental effects due to incineration.

UNIT – II:
Thermal Conversion Technologies: Fundamentals of thermal processing – combustion system – pyrolysis system – gasification system – environmental control system – energy recovery system – incineration.

UNIT – III:
Chemical Conversion Technologies: Acid & Alkaline hydrolysis – hydrogenation; solvent extraction of hydrocarbons; solvolysis of wood; biocrude; biodiesel production via chemical process; catalytic distillation; transesterification methods; Fischer-Tropsch diesel: chemicals from biomass - various chemical conversion processes for oil, gas, cellulose acetate.

UNIT – IV:
Biological Conversion Technologies: Nutritional requirement for microbial growth – types of microbial metabolism – types of microorganisms – environmental requirements – aerobic biological transformation – anaerobic biological transformation – aerobic composting – low solid anaerobic digestion – high solid anaerobic digestion – development of anaerobic digestion processes and technologies for treatment of the organic fraction of MSW – Biodegradation and biodegradability of substrate; biochemistry and process parameters of biomethanation - other biological transformation processes.

UNIT – V:
Biomass Energy Technologies: Biomass energy resources – types and potential; Energy crops - Biomass characterization (proximate and ultimate analysis); Biomass pyrolysis and gasification; Biofuels – biodiesel, bioethanol, Biobutanol; Algae and biofuels; Pellets and bricks of biomass; Biomass as boiler fuel; Social, economic and ecological implications of biomass energy.

UNIT – VI:
Conversion Devices: Combustors (Spreader Stokes, Moving grate type, fluidized bed), gasifier, digesters. Briqueting technology: Production of RDF and briquetted fuel. Properties of fuels derived from waste to energy technology: Producer gas, Biogas, Ethanol and Briquettes – conversion process with basic device formulation for agricultural residues and wastes including animal wastes; industrial wastes; municipal solid wastes; E-waste; Bio-medical waste; C&D waste; plastic waste and batteries waste.

TEXT BOOKS:
1. Integrated Solid Waste Management, George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, McGraw-Hill International Edition, New York, 1993
2. Energy from Waste - An Evaluation of Conversion Technologies, C. Parker and T. Roberts (Ed.), Elsevier Applied Science, London, 1985

REFERENCES:
1. Introduction to Biomass Energy Conversion, Capareda S., CRC Press, 2013
2. Thermo-chemical Processing of Biomass: Conversion into Fuels, Chemicals and Power, Brown RC and Stevens C, Wiley and Sons, 2011
3. Biomass Conversion Processes for Energy and Fuels, Sofer, Samir S. (Ed.), Zaborsky, R. (Ed.), New York, Plenum Press, 1981
4. Energy Recovery from Municipal Solid Waste Thermal Conversion Technologies, P. Jayarama Reddy, CRC Press, Taylor & Francis Group, London, UK, 2016

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B.Tech. VIII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1CE08) INTELLIGENT WASTE MANAGEMENT SYSTEM AND RECYCLING SYSTEM

COURSE PRE-REQUISITES: Solid Waste Management, Hazardous Waste Management, Waste to Energy

COURSE OBJECTIVES:
- To understand the concepts of Solid waste
- To understand the principle and process of IWMS Tools
- To understand the applications of IoT, ML, DL, BC and LCA & Carbon Footprint (CFP) based SWM
- To understand the principles of Process Systems Engineering (PSE) and various laws and regulation of SWM

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the fundamental concepts of Solid waste
CO-2: Apply the knowledge to resolve the practical problems with the help of IWMS Tools
CO-3: Apply the knowledge of IoT, ML, DL, BC and LCA & CFP to resolve the practical problems in SWM
CO-4: Impart the PSE knowledge and various laws and regulation to resolve the practical problems in SWM

UNIT – I:
Introduction to Solid Waste: Sources, Generation, Classification and Types of Solid Waste – Biomedical Waste – E-Waste – Construction and Demolition Waste – Plastic Waste – Batteries Waste – Hazardous Waste - Waste Management Through Waste Hierarchy: Reduce, Reuse, Recycle, Recover, and Disposal - Waste Operational Units: Equipment and Facilities: Collection and Transportation - Mechanical Treatment - Biological Treatment - Thermal Treatment – Disposal.

UNIT – II:
Introduction to IWMS Tools: Introduction – Need of the IWMS – functional elements of IWMS – Ultrasonic Sensor, Arduino Board, GSM Module, Bread Board, Power Supply (Battery) – Jump Wires - Navigation system – Cloud Services - Zero Waste Principle.

UNIT – III:
Applications in Intelligent Waste Management System: Introductory Applications of IoT, Machine Learning, Deep Learning and Block Chain Technology in Waste Characterization and Source Reduction, Storage, Collection and Transport of Wastes, Waste Processing Technologies and Waste Disposal.

UNIT – IV:
Life Cycle Assessment and Carbon-Footprint-Based IWMS: Phases of Life Cycle Assessment: Goal and Scope Definition - Life Cycle Inventory - Life Cycle Impact Assessment – Interpretation - LCA Waste Management Software - Umberto Software - SimaPro Software - LCA Assessment Methodology: Life Cycle Inventory Analysis - Life

Cycle Impact Assessment – Interpretation - Sensitivity Analysis - Carbon-Footprint-Based SWM - The Global-Warming Potential Impact - GHG Accounting - GWP Assessment for Solid Waste Management.

UNIT – V:
Principles of Systems Engineering: Systems Engineering Principles and Tools for SWM - Planning Regional Material Recovery Facilities - Optimal Planning for Solid Waste Collection, Recycling, and Vehicle Routing - Multiattribute Decision Making with Sustainability Considerations - Decision Analysis for Optimal Balance between Solid Waste Incineration and Recycling Programs - Environmental Informatics for Integrated Solid Waste Management - Future Perspectives.

UNIT – VI:
Regulatory Frameworks: Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, nuclear wastes - lead acid batteries, electronic wastes, plastics waste, bio-medical waste, construction and demolition waste and fly ash waste.

TEXT BOOKS:
1. Sustainable Solid Waste Management - A Systems Engineering Approach, Ni-Bin Chang and Ana Pires, IEEE & John Wiley & Sons, Inc., Hoboken, New Jersey, 2015
2. Integrated Solid Waste Management, George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, McGraw-Hill International Edition, New York, 1993

REFERENCES:
1. Manual on Municipal Solid Waste Management, CPHEEO, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2014
2. Smart Waste Management-Nutshell, Vishal Gupta, Amazon.com Services LLC, September 11, 2017
3. Recyclable Household Waste Management System for Smart Home in IOT, Manpreet Kaur & Dr. Kamaljit Singh Saini, Independently Published, June 12, 2018
4. GoI, Ministry of Environment and Forest and Climate Change, Various Recent Laws and Rules of Solid Waste Management

GREEN ENERGY

1. RENEWABLE ENERGY SOURCES

What we are studying?
The climate landscape is changing rapidly, and new technologies and solutions keep arising to respond to global and local challenges.
Renewable energy sources course makes you discover how Solar Thermal Energy conversion system works. It makes you understand how a Solar Photo voltaic generation system generates electricity. Scope of the course also includes wind energy generation. It also navigates you through Biomass and geo thermal energy generation systems.

Job opportunities:
When it comes to the hottest and most buzzing careers in the 21st century, the majority of people think of hardcore technical domains such as data science, machine learning & artificial intelligence. Few people might also come up with biotechnology (or biosciences). But, quite often people forget about one of the dark horses – the Renewable Energy sector. Even Bill Gates lobbied for the Energy sector as one of the top three career choices for making an impactful career.

Reference:
https://www.stoodnt.com/blog/careers-in-renewable-energy-job-opportunities-fields-of-study-and-top-universities/

2. RENEWABLE ENERGY TECHNOLOGIES

Within Crisis, there are seeds of opportunity..! We are at the wedge of fossil fuel end. After few years you can witness fuel crisis all over the world, as an engineer one must aware of the solution. To design sustainable systems those last for decades, one must use renewable energy as main or auxiliary source of energy. The application may be electrical or mechanical or chemical, one must convert energy from renewable source into electricity for ease of use.
Renewable Energy Technologies course will introduce you to Different types of Solar PV systems and their characteristics. Students will know the functionality of Power Converters such as Inverters etc., through block diagram approach. Fuel cell technology, which is one of the solutions for energy crisis will be discussed in detail. Course will conclude by discussing impact of PV panel production on environment and disposal of it.

Job Opportunities:
Green jobs in the renewable energy sector are expected to touch new figures with 6 digit monthly income. Following link may describe the interesting interdisciplinary careers for budding engineers.

Reference:
https://www.businessinsider.in/slideshows/miscellaneous/21-high-paying-careers-for-people-who-want-to-save-the-planet-and-also-have-job-security/slidelist/70677782.cms#slideid=70677804

3. ENERGY STORAGE TECHNOLOGIES

Battery technology is an essential skill for every engineer in present scenario. Course on energy storage technologies will enable student to, Design storage system Residential loads integrated to Renewable and storage systems for Electric Vehicles. It will make student to understand various electrochemical storages such as Lead acid, Li Ion cell etc. and their characteristics. The course enables student

to compare non-electric, electric storage systems and analyze application of them to various domains.

Job opportunities:
Upon successful completion of course student will enhance the chances of getting into EV industry , which almost open fact. Job Profiles include

i. Battery algorithms engineer
ii. Battery management engineer
iii. Battery modeling expert
iv. Design engineer – EV

4. ENERGY MANAGEMENT AND CONSERVATION

Energy Management And Conservation course is mainly intended to monitor Energy consumption of industries and to manage energy systems. This course also deals with methods of improving efficiency of electric machinery and to design a good illumination system. It also teaches student calculate pay back periods for energy saving equipment.

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B.Tech. V Semester	L	T/P/D	C
	3	0	3

(18OE1EE01) RENEWABLE ENERGY SOURCES

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the role of solar power
- To know components of PV system conversion
- To learn Operation of windmills
- To understand the principle operation of biomass and geo thermal energy systems

COURSE OUT COMES: After completion of the course, the student should be able to
CO-1: Understand Solar Thermal Energy conversion systems
CO-2: Understand Solar Photo voltaic systems
CO-3: Analyze wind energy conversion system
CO-4: Understand the principle operation of Biomass and geo thermal energy systems

UNIT – I:
Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sunshine, solar radiation data.

UNIT – II:
Solar Thermal Energy Conversion:
Solar Heating: Some basic calculations, The performance of solar heating devices, Available energy from the sun, The apparent motion of the sun, Evaluation of sunlight received by a collector, Flat solar panels - Different technologies of thermal solar collectors-Evaluation of the performance of solar collectors- Selective coatings for collectors and glazing, Solar heating systems -Individual and collective solar water heaters- Combined solar systems for the heating of buildings
Power Stations: Concentric Solar Power Plants- Concentrating systems- Components for production of heat and conversion into electricity

UNIT – III:
Solar PV Conversion: The PV Cell-Crystalline Solar cells-Thin film solar cell, Module, Array, Equivalent Electrical circuit, Open circuit voltage and Short circuit current, I-V, P-V Corves, Array design- Sun angle- effect of Temperature-Sun tracking, PV system components

UNIT – IV:
Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria, Maximum power Tracking of wind mills, Site selection of Wind mills, working Induction generator (Principle only)

UNIT – V:

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

UNIT – VI:

Geothermal & Ocean Energy: Resources, types of wells, methods of harnessing the energy, potential in India. OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

TEXT BOOKS:

1. Non-Conventional Energy Sources, G. D. Rai, Khanna Publishers
2. Renewable Energies, John Claude Sabbonedere, ISTE & John Wiley Publishers, 2007
3. Renewable Energy Resources, Twidell& Wier, CRC Press (Taylor & Francis), 2016

REFERENCE:

1. Wind & Solar Power Systems, Mukund R. Patel, CRC Press, 2003

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B.Tech. VI Semester

	L	T/P/D	C
	3	0	3

(18OE1EE02) RENEWABLE ENERGY TECHNOLOGIES

COURSE PRE-REQUISITES: Renewable Energy Sources

COURSE OBJECTIVES:
- To provide necessary knowledge about the modeling, design and analysis of various PV systems
- To show that PV is an economically viable, environmentally sustainable alternative to the world's energy supplies
- To understand the power conditioning of PV and WEC system's power output

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Model, analyze and design various photovoltaic systems
CO-2: Know the feasibility of PV systems as an alternative to the fossil fuels
CO-3: Design efficient stand alone and grid connected PV and WEC power systems

UNIT – I:
Behavior of Solar Cells-Basic Structure and Characteristics: Types - equivalent circuit-modeling of solar cells including the effects of temperature, irradiation and series/shunt resistances on the open-circuit voltage and short-circuit current-Solar cell arrays- PV modules-PV generators- shadow effects and bypass diodes- hot spot problem in a PV module and safe operating area.

UNIT – II:
Types of PV Systems: Grid connected PV systems- Net-metering- Estimation of actual a.c. output power from PV systems
Stand-alone system- Approach to designing an off-grid PV system with battery- with battery and diesel generator- Stand-alone solar water pumping system- Sizing/designing PV water pumping system- Problems

UNIT – III:
Power Converters for PV and Wind: Basic switching devices, AC-DC Rectifier, DC-AC inverter (Basic operation), DC DC converter - Buck, Boost converters Basic operation, Battery charger (Basic operation), grid interface requirements in Renewable energy integration

UNIT – IV:
Maximum Power Point Tracking: Various Sources of Losses is PV system, Charge Control in Battery Backed PV Systems, Maximum Power Point Tracking (MPPT)- Role of DC-DC converter in MPP tracking- Perturb and Observe Method-pseudo program for P&O method, Advanced Issues & Algorithms- search steps-variable step size algorithm. Peak Power operation of Wind Energy conversion system.

UNIT – V:
Fuel Cell Technology: History of Fuel cells, Fuel Cell Vehicle Emissions, Hydrogen safety factors, Principle of Operation- Fuel cell Model- cell voltage, Power and efficiency of fuel cell, Various types of fuel cells, Various storage systems for Hydrogen, Applications

UNIT – VI:
Solar Thermal Electricity Generation: Sterling Engine, Solar Pond, Solar Chimney
Solar PV System Environment Impact: Potential Hazards in production of PV cell, Energy payback and CO_2 emission calculations of PV systems, Procedure for decommissioning of PV plant, Future Trends of Wind Energy system

TEXT BOOKS:
1. Handbook of Renewable Energy Technology, Ahmed F. Zobaa, World Scientific Publishing Company, 2011
2. Wind and Solar Power Systems Design, Analysis, and Operation, Patel M. R., 2nd Edition, CRC Press, New York, 2005
3. Practical Handbook of Photovoltaics - Fundamentals and Applications, Augustin McEvoy, Tom Markvart, T. Markvart, L. Castaner, Elsevier Science, 2003

REFERENCE:
1. Electric Powertrain - Energy Systems, Power Electronics & Drives for Hybrid, Electric & Fuel Cell Vehicles, Goodarzi, Gordon A., Hayes, John G, John Wiley & Sons, 2018

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B.Tech. VII Semester	L	T/P/D	C
	3	0	3

(18OE1EE03) ENERGY STORAGE TECHNOLOGIES

COURSE PRE-REQUISITES: Renewable Energy Sources, Renewable Energy Technologies

COURSE OBJECTIVES:
- To understand Techno economic analysis of various storage systems
- To know Feasibility of different storage technologies
- To learn Operation of several electrochemical storage systems
- To understand Functionality of non-electric storage systems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Design storage system Residential loads integrated to Renewable and storage systems for Electric Vehicles
CO-2: Understand various electrochemical storage system
CO-3: Understand terminology and characteristics of Electro chemical systems
CO-4: Compare non-electric and electric storage system
CO-5: Analyze application of storage systems to various domains

UNIT – I:
Techno-economic Analysis of Various Energy Storage Technologies: Electrical Energy Storage (EES)-Definition-Role, Energy storage components, Applications and Technical support, Financial Benefits of EES, Techno economic analysis, Classification of Energy Storage systems, Comparison

UNIT – II:
Estimation of Energy Storage and Feasibility Analysis: Background-Solar Power-Wind Power (Brief discussion), Estimation-daily residential load-daily available solar energy-daily available wind energy-Importance, Estimation of Storage sizing- Steps for Storage sizing- Grid connected residential PV-grid connected residential Wind-hybrid system, Feasibility analysis of Storage systems- Various Terms involved- Case study of comparison between Off grid and grid connected systems

UNIT – III:
Electro Chemical Storage: Standard Batteries- Lead Acid- VRLA - Ni-cd, Modern Batteries- Ni MH- Li Ion, Flow Batteries – Br2 Zn-Vanadium Redox, Battery composition, construction, Principle of operation, Types, Advantages and disadvantages to above batteries.

UNIT – IV:
Terminology & Characteristics: Battery Terminology, Capacities, Definitions of various characteristics, Different States of charge-DOD-SOC-SOE-SOH-SOF, Resistance, Battery Design, Battery Charging, Charge Regulators, Battery Management, General Equivalent Electrical Circuit, Performance Characteristics

UNIT – V:
Non-Electric Storage Technologies: Flywheel, Energy Relations, Flywheel System Components, Benefits of Flywheel over Battery, Superconducting Magnet Energy Storage, Compressed Air Energy storage, Overview Thermal Energy Storage. Capacitor bank storage, Comparison of storage Technologies

UNIT –VI:
Applications: Domains of applications of Energy storage- Starter-Traction-stationary-mobile or nomadic, Review of storage requirements, Storage for Electric Vehicle application, Storage for hybrid vehicle-Regenerative Braking-Super capacitor-hybrid capacitor

TEXT BOOKS:
1. Energy Storage Technologies and Applications, Ahmed Faheem Zobaa, InTech Publishers, 2013
2. Lithium Batteries and Other Electrochemical Storage Systems, Christian Glaize, Sylvie Geniès, ISTE & John Wiley, 2013
3. Wind and Solar Power Systems, Mukund R. Patel, 2nd Edition, CRC Press, 2006

REFERENCES:
1. Rechargeable Batteries Applications Handbook, EDN Series for Design Engineers, Elsevier

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B.Tech. VIII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1EE04) ENERGY MANAGEMENT AND CONSERVATION

COURSE PRE-REQUISITES: Renewable Energy sources, Renewable Energy Technologies, Energy Storage Technologies

COURSE OBJECTIVES:
- To understand the necessity of conservation of Energy
- To Know the methods of Energy management
- To identify the factors to increase the efficiency of electrical equipment
- To know the benefits of carrying out energy Audits

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: To conduct Energy Audit of industries
CO-2: To manage energy Systems
CO-3: To specify the methods of improving efficiency of electric motor
CO-4: To improve power factor and to design a good illumination system
CO-5: To calculate pay back periods for energy saving equipment

UNIT – I:
Basic Principles of Energy Audit: Energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit

UNIT – II:
Energy Management: Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manager, Qualities and functions, language, Questionnaire - check list for top management

UNIT – III:
Energy Efficient Motors: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed, variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit

UNIT – IV:
Power Factor Improvement, Lighting and Energy Instruments: Power factor – methods of improvement, location of capacitors, p.f with non-linear loads, effect of harmonics on p.f., p.f motor controllers – simple problems
Lighting Energy Audit and Energy Instruments: Good lighting system design and practice, lighting control, lighting energy audit - Energy Instruments- watt meter, data loggers, thermocouples, pyrometers, flux meters, tongue testers, application of PLC's

UNIT – IV:

Economic Aspects and Analysis: Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis.

UNIT – VI:

Analysis of Energy Efficient Motor: Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

TEXT BOOKS:
1. Energy Management, W. R. Murphy & G. Mckay, Butterworth-Heinemann Publications
2. Energy Management, Paul o' Callaghan, 1st Edition, McGraw-Hill Book Company, 1998

REFERENCES:
1. Energy Efficient Electric Motors, John C. Andreas, 2nd Edition, Marcel Dekker Inc. Ltd., 1995
2. Energy Management Handbook, W. C. Turner, John Wiley and Sons
3. Energy Management and Good Lighting Practice: Fuel Efficiency Booklet12-EEO

3D PRINTING AND DESIGN

3D PRINTING AND DESIGN

3D Printing is a process for making a physical object from a three-dimensional digital model by laying down many successive thin layers of a material. It brings a digital CAD model into its physical form by adding layer by layer of materials. Thus called 'Additive Manufacturing'. It is the opposite of subtractive manufacturing i.e., removing material from an object using a mechanical machine. It enables to produce complex shapes using less material than traditional manufacturing methods. There are several different techniques to 3D print an object. It saves time through prototyping and is also responsible for manufacturing impossible shapes. Due to these, it has many applications in different fields like consumer products (eyewear, footwear, design, furniture, industrial products (manufacturing tools, prototypes, functional end-use parts, dental products, prosthetics, architectural scale models, reconstructing fossils, replicating ancient artefacts, reconstructing evidence in forensic pathology etc.

3D printing has good prospects from career perspective. Various positions that could be available are CAD designers, engineers, technical developers, software developers, electronics engineers, etc.

This OE track consists of 04 courses and is designed with an objective to provide an overview of all the constituents of 3D Printing starting from elements of CAD that are needed to create CAD models, followed by basics of 3D Printing required for setting the parameters, then the machines and tools used in 3D Printing for thorough understanding of systems and processes and finally the reverse engineering of 3D printing models from actual objects.

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

(18OE1ME01) ELEMENTS OF CAD

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the basics of CAD and devices used
- To know the various types of modeling used in CAD
- To appreciate the concept of feature-based modeling and geometric transformations
- To comprehend the assembly modeling procedure and data exchange formats

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Know the fundamentals of CAD and devices used
CO-2: Identify the types of CAD modeling techniques and utilize them
CO-3: Evaluate the objects or models using geometric transformations and manipulations
CO-4: Perform the assembly modeling and asses the various data exchange formats

UNIT – I:
Fundamentals of CAD: Introduction to Computer Aided Design (CAD), Design process, Application of computers for Design and Manufacturing, Benefits of CAD, Brief overview of computer peripherals for CAD.

UNIT – II:
Geometric Modeling: Introduction to Geometric Model, Types of modeling, Curve representation
Wireframe Modeling: Introduction, advantages, limitations and applications, Wire frame entities-analytic and synthetic, Basic definitions of Cubic, Bezier and B-spline curves

UNIT – III:
Surface Modeling: Introduction, advantages, limitations and applications, surface entities, Basic definitions of analytic surfaces - planar surface, ruled surface, tabulated cylinder, surface of revolution; Basic definitions of synthetic surfaces - Bezier surface, B-spline surface

UNIT – IV:
Solid Modeling: Introduction, advantages, limitations and applications, Solid Entities, Solid Representation schemes – Boundary Representation (B-Rep) scheme, Constructive Solid Geometry (CSG) scheme.
Feature-based Modeling: Introduction, Feature entities, Feature representation, 3D Sketching, Parameter, Relations and Constraints

UNIT – V:

Geometric Transformations: Introduction to 2D & 3D transformations, Brief treatment on Translation, Scaling, Reflection and Rotation using Homogeneous and concatenated transformations

Manipulations: Displaying, Segmentation, Trimming, Intersection, Projection

UNIT – VI:

Assembly Modeling: Introduction, Assembly modeling, Assembly Tree, Mating Conditions, Bottom-up and Top-down approach

Product Data Exchange: Introduction, Graphics Standards, Types of translators, Importance of formats in 3D Printing, Data exchange formats - IGES, STEP and STL

TEXT BOOKS:
1. CAD/CAM Theory and Practice, Ibrahim Zeid, Tata McGraw-Hill
2. Mastering CAD/CAM, Ibrahim Zeid, Tata McGraw-Hill
3. CAD/CAM-Computer Aided Design and Manufacturing, Mikell P. Groover, E.W. Zimmers, Pearson Education/Prentice Hall

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B.Tech. VI Semester

L	T/P/D	C
3	0	3

(18OE1ME02) INTRODUCTION TO 3D PRINTING

COURSE PRE-REQUISITES: Elements of CAD

COURSE OBJECTIVES:
* To understand the need of 3D Printing
* To understand about the process chain involved in 3D Printing
* To know about the two-dimensional layer by layer techniques, solid based systems & 3D Printing data exchange formats
* To know the post processing methods involved in 3D Printing

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Summarize the importance of 3D Printing
CO-2: Explain the process chain involved in 3D Printing
CO-3: Explain about two-dimensional layer-by-layer techniques, solid based systems and 3D printing data exchange formats
CO-4: Apply the knowledge gained in the post-processing methods

UNIT – I:
Introduction to 3D Printing: Introduction to 3D Printing, 3D Printing evolution, Classification of 3D Printing, Distinction between 3D Printing & CNC Machining, Advantages of 3D Printing

UNIT – II:
Generalized 3D Printing Process Chain: Process chain, Materials for 3D Printing, Design for 3D Printing and Overview of Medical Modeling& Reverse Engineering.

UNIT – III:
Two-Dimensional Layer-By-Layer Techniques: Stereolithography (SL), Selective Laser Sintering (SLS), Selective Powder Building (SPB), Advantages and Applications.

UNIT – IV:
Solid Based Systems: Introduction, basic principles, Fused Deposition Modeling, Multi-Jet Modeling, Laminated Object Manufacturing (LOM), Advantages and Applications.

UNIT – V:
3D Printing Data Exchange Formats: STL Format, STL File Problems, Brief Overview of other translations like IGES File, HP/GL File and CT data only.

UNIT – VI:
Post-Processing: Introduction, Support Material Removal, Surface Texture Improvements, Accuracy Improvements, Aesthetic Improvements.

TEXT BOOKS:
1. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Ian Gibson, David W. Rosen, Brent Stucker, Springer, 2010
2. Rapid Prototyping: Principles & Applications, Chuaa Chee Kai, Leong Kah Fai, World Scientific, 2010

REFERENCES:
1. Rapid Prototyping: Theory and Practice, Ali K. Karmani, EmandAbouel Nasr, Springer, 2006
2. Understanding Additive Manufacture: Rapid Prototyping, Rapid Tooling and Rapid Manufacture, Andreas Gebhardt, Hanser Publishers, 2013
3. Rapid Manufacturing: Advanced Research in Virtual and Rapid Prototyping, Hopkinson, N. Haque, and Dickens, Taylor and Francis, 2007

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B.Tech. VII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1ME03) 3D PRINTING-MACHINES, TOOLING AND SYSTEMS

COURSE PRE-REQUISITES: Elements of CAD, Introduction to 3D Printing

COURSE OBJECTIVES:
- To understand the need of prototyping
- To understand about the liquid and solid based 3D printing systems
- To know about the liquid-based 3D printing systems & rapid tooling
- To know the applications of 3D Printing

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Summarize the importance of 3D Printing
CO-2: Explain the process involved in liquid and solid based 3D printing systems
CO-3: Explain about the liquid-based 3D printing systems and rapid tooling
CO-4: Adapt the knowledge gained in applications of 3D Printing

UNIT – I:
Introduction: Prototype Fundamentals, Types of Prototypes, Roles of Prototypes, Phases of Development Leading to Rapid Prototyping, Fundamentals of Rapid Prototyping.

UNIT – II:
Liquid Based 3D Printing Systems: Introduction, Principles, Processes and Applications of Solid Ground Curing, Material Jetting & Binder Jetting

UNIT – III:
Solid Based 3D Printing Systems: Introduction, Principles, Processes and Applications of Fused Deposition Modelling (FDM), Paper Lamination Technology (PLT) and Laminated Object Manufacturing (LOM)

UNIT – IV:
Laser Based 3D Printing Systems: Selective Laser Sintering (SLS)-Principle, Process and Applications, Three-Dimensional Printing- Principle, Process and Applications, Laser Engineered Net Shaping (LENS)- Principle, Process and Applications

UNIT – V:
Rapid Tooling: Introduction and need for Rapid Tooling, Overview of Indirect and Direct Processes, Applications

UNIT – VI:
3D Printing Applications: Brief overview of Applications in Design, Engineering, Aerospace Industry, Automotive Industry and Biomedical Industry

TEXT BOOKS:
1. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Ian Gibson, David W. Rosen, Brent Stucker, Springer, 2010

2. Rapid Prototyping: Principles & Applications, Chuaa Chee Kai, Leong Kah Fai, World Scientific, 2010

REFERENCES:
1. Rapid Prototyping: Theory and Practice, Ali K. Karmani, EmandAbouel Nasr, Springer, 2006
2. Understanding Additive Manufacture: Rapid Prototyping, Rapid Tooling and Rapid Manufacture, Andreas Gebhardt, Hanser Publishers, 2013
3. Rapid Manufacturing: Advanced Research in Virtual and Rapid Prototyping, Hopkinson, N. Haque, and Dickens, Taylor and Francis, 2007

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B.Tech. VIII Semester	L	T/P/D	C
	3	0	3

(18OE1ME04) REVERSE ENGINEERING

COURSE PRE-REQUISITES: Elements of CAD, Introduction to 3D Printing, 3D Printing Machines, Tooling & Systems

COURSE OBJECTIVES:
- To understand the Reverse Engineering (RE) methodology
- To disassemble products and specify the interactions between its subsystems and their functionality
- To understand Computer-Aided RE and Rapid Prototyping technology

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Basic understanding of engineering systems
CO-2: Understanding the terminologies related to re-engineering, forward engineering, and reverse engineering
CO-3: Understanding of reverse engineering methodologies
CO-4: Understanding of reverse engineering of systems

UNIT-I:
Introduction to Reverse Engineering: Need, Definition, The Generic Process, History of Reverse Engineering, Scopeand tasks of RE, Domain analysis, Overview of Applications

UNIT-II:
Methodologies and Techniques: Potential for Automation with 3-D Laser Scanners, Computer-aided (Forward) Engineering, Computer-aided Reverse Engineering, Computer Vision and Reverse Engineering

UNIT-III:
Data Acquisition Techniques: Contact Methods- Coordinate Measurement Machine and Robotic Arms; Noncontact Methods- Triangulation, and Structured Light, Destructive Method; Issues involved in data acquisition techniques

UNIT-IV:
Pre-processing Techniques: Need of pre-processing, Data formats, Import of point cloud data, Reduction and filtering of data
Triangular Mesh Modeling: Need,FIltering of triangular mesh model and its definition, Topological characteristics, Euler formula for triangular mesh model, Various methods of construction of triangular mesh model.

UNIT-V:
Segmentation: Definition and need, Methods for segmentation -Edge based and face based.
Integration Between Reverse Engineering and Additive manufacturing: Modeling Cloud Data, Integration of RE and AM for Layer-based Model Generation, Adaptive Slicing Approach for Cloud Data Modeling, Planar Polygon Curve Construction for a Layer, Determination of Adaptive Layer Thickness

UNIT-VI:

Applications: Automotive, Aerospace, Medical sectors

Legal Aspects: Copyright Law, Reverse Engineering, Recent Case Law Barriers in adopting RE

TEXT BOOKS:

1. Reverse Engineering: An Industrial Perspective, V. Raja and K. Fernandes, Springer-Verlag
2. Reverse Engineering, K. A. Ingle, McGraw-Hill
3. Reverse Engineering, L. Wills and P. Newcomb, 1st Edition, Springer-Verlag

REFERENCES

1. Smart Product Engineering, Michael Abramovici, Rainer Stark, Springer Berlin Heidelberg
2. Product Design: Techniques in Reverse Engineering and New Product Development, K. Otto and K. Wood, Prentice Hall, 2001

INTERNET OF THINGS

INTERNET OF THINGS

Internet of Things: The IoT creates opportunities for more direct integration of the physical world into computer-based systems, resulting in efficiency improvements, economic benefits, and reduced human exertions. *IoT* **is changing how we live, work, travel, and do business. It is even the basis of a new industrial transformation, known as** Industry 4.0**, and key in the** digital transformation **of organizations, cities, and society overall.** The IoT track helps students to learn about how to

- Learn different protocols and connectivity technologies used in IOT.
- Expose the various sensors and transducers for measuring mechanical quantities.
- Develop simple applications using 8051 microcontrollers.
- Understand the key routing protocols for sensor networks and their design issues.

Some of the more common career paths in the Internet of Things path are

- IoT Developer. ...
- IoT Architect…
- IoT Embedded Systems Designer…
- IoT Solutions Engineer…
- Professional in Sensors and Actuators…
- Embedded Programs Engineer…
- Safety Engineer…

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester

	L	T/P/D	C
	3	0	3

(18OE1EC01) SENSORS TRANSDUCERS AND ACTUATORS

COURSE PRE-REQUISITES: Engineering Physics, Electronic Measuring Instruments

COURSE OBJECTIVES:
- To expose the students to various sensors and transducers for measuring mechanical quantities
- To make the students familiar with the specifications of sensors and transducers
- To make the students identify for various sensors and transducers for various applications
- To expose the students to various actuators

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Familiar with classification and characteristics of various sensors and transducers
CO-2: Familiar with the principle and working of various sensors and transducers
CO-3: Familiar with the principle and working of various actuators
CO-4: Able to select proper Transducer / Sensor for a specific measurement application
CO-5: Able to select proper Actuator for a specific measurement application

UNIT – I:
Primary Sensing Elements and Transducers: Mechanical devices as primary detectors, mechanical spring devices, pressure sensitive primary devices, flow rate sensing elements, Transducers-electrical Transducers, classification of Transducers, characteristics and choice of Transducers, factors influencing the choice of Transducers.

UNIT – II:
Electric Transducers: Resistive transducers, Potentiometers, Strain gauges, Types of Strain gauges, Resistance thermometers, Thermistors, Thermocouples, variable Inductance Transducers, Linear Variable Differential Transformer, Synchros, Resolvers, Capacitive Transducers, Piezo electric Transducers.

UNIT – III:
Magnetic and Optical Transducers: Hall Effect Transducers, Magneto resistors, Magneto-Elastic and Magneto-Strictive Transducers, Opto electronic Transducers, Digital Encoding Transducers, Photo Optic Transducers.

UNIT – IV:
Smart Sensors and Applications: Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication, Standards for Smart Sensor Interface, the Automation. Sensors Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing, Sensors for environmental Monitoring.

UNIT – V:

Mechanical and Electrical Actuators: Mechanical Actuation Systems-Types of motion, Kinematic chains, Cams, Gears, Ratchet and pawl, Belt and chain drives, Bearings, Mechanical aspects of motor selection, Electrical Actuation Systems, Electrical systems, Mechanical switches, Solid-state switches, Solenoids, D.C. Motors, A.C. Motors, Stepper motors.

UNIT – VI:

Pneumatic and Hydraulic Actuators: Pneumatic and Hydraulic Actuation Systems-Actuation systems, Pneumatic and hydraulic systems, Directional Control valves, Pressure control valves, Cylinders, Servo and proportional control valves, Process control valves, Rotary actuators.

TEXT BOOKS:
1. A Course in Electrical and Electronic Measurements and Instrumentation, A. K. Sawhney, Puneet Sawhney,19th Edition, 2011
2. Sensors and Transducers, D. Patranabis, 2nd Edition, PHI Learning Private Limited, 2013
3. Mechatronics, W. Bolton, 7th Edition, Pearson Education Limited, 2018

REFERENCES:
1. Sensors and Actuators, Patranabis, 2nd Edition, PHI, 2013

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B.Tech. VI Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1EC02) INTRODUCTION TO MICROCONTROLLER AND INTERFACING

COURSE PRE-REQUISITES: Sensors Transducers and Actuators

COURSE OBJECTIVES:
- To differentiate various number systems
- To understanding programming concepts
- To develop simple applications using 8051 microcontrollers

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand basic computing concepts
CO-2: Know architecture of 8051 microcontrollers
CO-3: Program internal resources of 8051 microcontroller
CO-4: Interface peripherals to 8051 microcontroller

UNIT – I:
Introduction to Computing: Numbering and Coding Systems: Binary, Decimal, Hexadecimal and conversions, Binary and Hexadecimal Arithmetic, Complements, Alphanumeric codes. Digital Premier, Inside the Computer

UNIT – II:
Embedded System Design: Embedded system - Definition, Characteristics of embedded computing applications, Design challenges, Requirements, Specification, Architecture design, Designing hardware and software components, system integration, Design example: Model train controller.

UNIT – III:
8051 Microcontroller: Microcontrollers and Embedded Processors, Architecture and Programming Model of 8051, Special Function Register formats, Memory Organization, Timers and Counters- Operating modes, Serial port, Interrupts

UNIT – IV:
8051 Programming in C: Data types, software delay generation, Logical operations, Accessing code and data space in 8051, I/O port programming, Timer/counter programming.

UNIT – V:
8051 Programming: Serial IO modes and their programming in C, interrupts programming in C: serial, timer and external interrupts.

UNIT – VI:
Introduction to Arduino: Features of Arduino, Arduino components and IDE, Interfacing: Seven Segment Display, Pulse Width Modulation, Analog Digital Converter, Wireless connectivity to Arduino. Case study: From BT To WiFi: Creating WiFi Controlled Arduino Robot Car.

TEXT BOOKS:

1. The 8051 Microcontroller: Programming, Architecture, Ayala &Gadre, Cengage Publications 3rd Edition, 2008
2. The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, 2nd Edition, 2005

REFERENCES:

1. Digital Design, Morris Mano, PHI, 3rd Edition, 2006
2. Embedded Systems: Architecture, Programming and Design, 2nd Edition, TMH

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B.Tech. VII Semester	L	T/P/D	C
	3	0	3

(18OE1EC03) IOT PROTOCOLS AND ITS APPLICATIONS

COURSE PRE-REQUISITES: Sensors Transducers and Actuators, Introduction to Microcontrollers and Interfacing

COURSE OBJECTIVES:
- To understand the basics of Internet of Things and Cloud of things
- To learn different protocols and connectivity technologies used in IOT
- To understand various IoT platforms
- To learn different applications with IoT

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the concepts of Internet of Things and Cloud of things
CO-2: Analyze various protocols for IoT
CO-3: Apply IOT to different applications in the real world

UNIT – I:
Introduction to Internet of Things: Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Deployment Templates, M2M, IoT vs M2M.

UNIT – II:
IoT Protocols: Message Queuing Telemetry Transport (MQTT), Secure Message Queuing Telemetry Transport (SMQTT), Constrained Application Protocol (CoAP), Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP)

UNIT – III:
Connectivity Technologies: IEEE802.15.4, ZIGBEE, 6LOWPAN, Wireless HART, Z-Wave, Bluetooth, NFC, RFID.
Prototyping Embedded Device: Sensors, Actuators, Embedded computing Basics, System on chips.

UNIT – IV:
IoT Platforms: IoT Platforms – Introduction to IoT Platforms (AWS IoT, IBM Watson, ARM Mbed), Cloud Storage models and communication APIs, Python web application framework Designing a RESTful web API.

UNIT – V:
Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT – VI:
Domain Specific Applications of IoT: IoT Design Methodology, Applications of IoT–
Home, Health, Environment, Energy, Agriculture, Industry and Smart City.

TEXT BOOKS:
1. Internet of Things: A Hands-On Approach, Vijay Madisetti, ArshdeepBahga,
   Universities Press, 2015
2. The Internet of Things – Key Applications and Protocols, Olivier Hersent, David
   Boswarthick, Omar Elloumi, Wiley, 2012
3. The Internet of Things in the Cloud: A Middleware Perspective, Honbo Zhou, CRC
   Press, 2012

REFERENCES:
1. Internet of Things: Converging Technologies for Smart Environments and
   Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers, 2013
2. Building the Internet of Things, Sara Cordoba, WimerHazenberg, Menno Huisman,
   BIS Publishers, 2011
3. Designing the Internet of Things, Adrian Mcewen, HakinCassimally, John Wiley and
   Sons, 2015

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B.Tech. VIII Semester	L	T/P/D	C
	3	0	3

(18OE1EC08) WIRELESS SENSOR NETWORKS

COURSE PRE-REQUISITES: Sensors Transducers and Actuators, Introduction to Microcontrollers and Interfacing, IoT Protocols and its applications

COURSE OBJECTIVES:
- To expose basic concepts of wireless sensor network technology
- To study medium access control protocols and various issues in a physical layer
- To understand the key routing protocols for sensor networks and their design issues
- To understand sensor management in networks and design requirements

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Appreciate various design issues of wireless sensor networks
CO-2: Understand the hardware details of different types of sensors and select the application specific sensor
CO-3: Understand radio standards and communication protocols to be used for wireless sensor networks

UNIT – I:
Introduction: Overview of sensor network architecture and its applications, sensor network comparison with Ad Hoc Networks, Sensor node architecture with hardware and software details.

UNIT – II:
Hardware: Examples like mica2, micaZ, telosB, cricket, Imote2, tmote, btnode, and Sun SPOT, Software (Operating Systems): TinyOS, MANTIS, Contiki, and RetOS.

UNIT – III:
Programming Tools: C, nesC. Performance comparison of wireless sensor networks simulation and experimental platforms like open source (ns-2) and commercial (QualNet, Opnet, NetSim)

UNIT – IV:
Overview of Sensor Network Protocols (Details of at least 2 important protocol per layer): Physical, MAC and routing/ Network layer protocols, node discovery protocols, multi- hop and cluster-based protocols, Fundamentals of 802.15.4, Bluetooth, BLE (Bluetooth low energy), UWB.

UNIT – V:
Data Dissemination and Processing: Differences compared with other database management systems, Query models, In-network data aggregation, data storage; query processing.

UNIT – VI:

Specialized Features: Energy preservation and efficiency; security challenges; Fault tolerance, Issues related to Localization, connectivity and topology, Sensor deployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research, and Enabling technologies in wireless sensor network.

TEXT BOOKS:
1. Wireless Sensor Networks Technology, Protocols, and Applications, Kazem Sohraby, Daniel Minoli, TaiebZnati, John Wiley & Sons, 2007
2. Protocols and Architectures for Wireless Sensor Networks, H. Karl and A. Willig, John Wiley & Sons, India, 2012
3. Wireless Sensor Networks, C. S. Raghavendra, K. M. Sivalingam, and T. Znati, Editors, 1st Indian Reprint, Springer Verlag, 2010

REFERENCES:
1. Wireless Sensor Networks: An Information Processing Approach, F. Zhao and L. Guibas, Morgan Kaufmann, 1st Indian Reprint, 2013
2. Wireless Sensor Network and Applications, Yingshu Li, My T. Thai, Weili Wu, Springer Series on Signals and Communication Technology, 2008
3. Principles of Mobile Communications, Gordon L. Stuber, 2nd Edition, Springer International, 2001

AUGMENTED REALITY (AR) / VIRTUAL REALITY (VR)

AUGMENTED REALITY (AR) / VIRTUAL REALITY (VR)

Augmented reality and virtual reality (AR & VR): Augmented reality (AR) and Virtual Reality (VR) bridge the digital and physical worlds. They allow you to take in information and content visually, in the same way you take in the world. AR dramatically expands the ways our devices can help with everyday activities like searching for information, shopping, and expressing yourself. VR lets you experience what it's like to go anywhere from the front row of a concert to distant planets in outer space.

Job Roles in Augmented reality and virtual reality (AR & VR) Track
- Design Architect. ...
- Software Designer. ...
- System Validation Engineers. ...
- Software Developer. ...
- 3D Artist…

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B.Tech. V Semester	L	T/P/D	C
	3	0	3

(18OE1EC04) INTRODUCTION TO C-SHARP

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the foundations of CLR execution
- To learn the technologies of the .NET framework and object-oriented aspects of C#
- To be aware of application development in .NET
- To learn web-based applications on .NET (ASP.NET)

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain how C# fits into the .NET platform
CO-2: Analyze the basic structure of a C# application
CO-3: Develop programs using C# on .NET
CO-4: Design and develop Web based applications on .NET

UNIT – I:
Introduction to C#: Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

UNIT – II:
Object Oriented Aspects of C#: Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

UNIT – III:
Application Development on .NET: Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box (Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures

UNIT – IV:
SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.

UNIT – V:
Web Based Application Development on .NET: Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

UNIT – VI:
CLR and .NET Framework: Assemblies, Versoning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security in .NET

TEXT BOOKS:
1. The Complete Reference: C# 4.0, Herbert Schildt, Tata McGraw-Hill, 2012
2. Professional C# 2012 with .NET 4.5, Christian Nagel et al. Wiley India, 2012

REFERENCES:
1. Pro C# 2010 and the .NET 4 Platform, Andrew Troelsen, 5th Edition, A Press, 2010
2. Programming C# 4.0, Ian Griffiths, Matthew Adams, Jesse Liberty, 6th Edition, O"Reilly, 2010

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester	L	T/P/D	C
	3	0	3

(18OE1EC05) INTRODUCTION TO SIGNAL PROCESSING

COURSE PRE-REQUISITES: Introduction to C Sharp

COURSE OBJECTIVES:
- To understand various fundamental characteristics of signals and systems
- To analyze signals in frequency domain
- To know principles of signal transmission through systems
- To understand fundamentals of digital signal

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Classify signals and implement various operations on signals
CO-2: Analyze the characteristics of signals and systems
CO-3: Understand the basics of filter design
CO-4: Appreciate the processes of Multirate systems

UNIT – I:
Representation of Signals: Continuous time and Discrete Time signals, Classification of Signals – Periodic and aperiodic, even and odd, energy and power signals, deterministic and random signals, causal and non-causal signals, complex exponential and sinusoidal signals. Concepts of standard signals. Various operations on Signals.

UNIT – II:
Representation of Systems: Classification of discrete time Systems, impulse response, Concept of convolution in time domain and frequency domain, response of a linear system, System function, Signal bandwidth, system bandwidth. Ideal filter characteristics.

UNIT – III:
Sampling Theorem: Representation of continuous time signals by its samples - Sampling theorem – Reconstruction of a Signal from its samples, aliasing
Z –Transform: Basic principles of z-transform, region of convergence, properties of ROC, Inverse z-transform using Partial fraction.

UNIT – IV:
Introduction to Digital Signal Processing: Applications of Z-Transforms- Solution of Linear Constant Coefficient Difference equations (LCCD), System function, Frequency Response of the system.

UNIT – V:
Discrete Fourier Transforms: Circular convolution, Comparison between linear and circular convolution, Computation of DFT.
IIR Digital Filters: Design of IIR Digital filters (H(s) to be given) - Impulse invariance transformation techniques, Bilinear transformation method.

UNIT – VI:
FIR Digital Filters: Characteristics of linear phase FIR filters and its frequency response, Comparison of IIR and FIR filters. Design of FIR filters using Fourier Method and Windowing Technique (only Hanning).
Realization of IIR and FIR Filters: Direct and Cascade forms.

TEXT BOOKS:
1. Signals, Systems and Communications, B. P. Lathi, BS Publications, 2009
2. Signals and Systems, Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, 2nd Edition, PHI
3. Digital Signal Processing: Principles, Algorithms and Applications, John G. Proakis, D.G. Manolakis, 4th Edition, Pearson/PHI, 2009

REFERENCES:
1. Signals and Systems, Simon Haykin and Barry Van Veen, 2nd Edition, John Wiley
2. Signals, Systems and Transforms, C. L. Philips, J. M. Parr and Eve A. Riskin, 3rd Edition, Pearson, 2004
3. Signals and Systems, Schaum's Outlines, Hwei P. Hsu, Tata McGraw-Hill, 2004
4. Digital Signal Processing – A Practical Approach, Emmanuel C. Ifeacher, Barrie W. Jervis, 2nd Edition, Pearson Education

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B.Tech. VII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1EC06) INTRODUCTION TO IMAGE AND VIDEO PROCESSING

COURSE PRE-REQUISITES: Introduction to C Sharp, Introduction to Signal Processing

COURSE OBJECTIVES:
- To introduce fundamentals of digital image and video processing
- To demonstrate digital signal processing techniques in spatial and frequency domains
- To study and compare various image and video compression algorithms
- To study applications of motion estimation in video processing

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Acquire, represent the digital image and transforms
CO-2: Apply various pixel position and intensity-based image processing techniques
CO-3: Understand and analyze the performance of block matching algorithms in MPEG video coding standards

UNIT – I:
Fundamentals of Image Processing and Image Transforms: Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels, 2 – D Discrete Fourier Transform, Discrete Cosine Transform, Introduction to Wavelet transforms.

UNIT – II:
Image Enhancement-Spatial Domain Methods: Point Processing, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters.

UNIT – III:
Image Enhancement-Frequency Domain Methods: Basics of filtering in frequency domain, Image Smoothing, Image Sharpening, Selective Filtering.
Image Segmentation: Segmentation Concepts, Point, Line and Edge Detection, Thresholding, Region Based Segmentation.

UNIT – IV:
Image Compression: Image compression fundamentals – coding Redundancy, spatial and temporal redundancy.
Compression Models: Lossy and Lossless, Huffmann coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding.

UNIT – V:
Basic Steps of Video Processing: Analog video, Digital Video, Time varying Image Formation models: 3D motion models, Geometric Image formation, Photometric Image formation, sampling of video signals.

UNIT – VI:

2-D Motion Estimation: Optical flow, pixel-based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Application of motion estimation in video coding.

TEXT BOOKS:

1. Digital Image Processing, Gonzaleze and Woods, 3rd Edition, Pearson
2. Video Processing and Communication, Yao Wang, JoemOstarmann and Ya – Quin Zhang, 1st Edition, PHI

REFERENCES:

1. Digital Video Processing, M. Tekalp, Prentice Hall International
2. Image Acquisition and Processing with LabVIEW, Relf, Christopher G., CRC Press
3. Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms, Aner Ozdemi R, John Wiley & Sons
4. Fundamentals of Digital Image Processing, A Practical Approach with Examples in Matlab, Chris Solomon, Toby Breckon, John Wiley & Sons

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B.Tech. VIII Semester	L	T/P/D	C
	3	0	3

(18OE1EC07) APPLICATIONS OF AR AND VR

COURSE PRE-REQUISITES: Introduction to C Sharp, Introduction to Signal Processing, Introduction to Image & Video Processing

COURSE OBJECTIVES: Throughout the course, student will be expected to develop AR VR applications by being able to do each of the following:
- A review of current Virtual Reality (VR) and Augmented Reality (AR) technologies
- The fundamentals of VR/AR modeling and programming
- Provides a detailed analysis of engineering scientific and functional aspects of VR/AR

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Acquire knowledge in main applications VR / AR technologies
CO-2: Analyze different tools for VR/AR applications
CO-3: Developing VR/AR applications

UNIT – I:
Augmented Reality and Virtual Reality:
Augmented Reality: Introduction to Augmented Reality (AR), Fundamentals, Chronicle order of AR, features
Virtual Reality: Introduction to Virtual Reality (VR), Features of VR and Chronicle order of VR; Difference between AR and VR.

UNIT – II:
Types of Augmented Reality: Marker based AR, Marker less AR, Projection based AR, Super Imposition based AR, Applications of AR.

UNIT – III:
Types of Virtual Reality: Non- immersive simulation, Semi-immersive simulations, Fully immersive simulations; Applications VR.

UNIT – IV:
Making an AR App with Simple CUBE: Introduction to Unity, Installation steps, Fundamentals while implementing Project, importing a cube, Create an account in Vuforia, license manager, target manager, downloading database and uploading target database in unity.

UNIT – V:
AR App with Interaction: Introduction to C#, Scripting interactive objects, implementation C# Script using unity, uploading target object, deploying application into ANDROID Device.

UNIT – VI:
Creating an Virtual Reality: Creating an Virtual Reality Scene in unity, adding colliders, Settings of Unity to make the application compatible with Google cardboard.

TEXT BOOKS:
1. Virtual Reality & Augmented Reality in Industry, Ma D., Gausemeier J., Fan X., Grafe M. (Eds.) Springer, 2011

REFERENCES:
1. http://www.realitytechnologies.com/augmented-reality/vitual-reality
2. https://en.wikipedia.org/wiki/Augmented_reality/vitual-reality
3. https://computer.howstuffworks.com/augmented-reality.html
4. https://www.theguardian.com/technology/augmented-reality

ADDITIONAL RESOURCES:
1. https://jasoren.com/making-an-ar-app-with-vuforia-and-unity3d/
2. http://www.psych.purdue.edu/~willia55/120/6.S-PMM.pdf

ARTIFICIAL INTELLIGENCE

ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is a cognitive science with highly research activities in the major areas like Machine Learning, Robotics, Natural Language Processing and image processing. This track will cover basic foundations of artificial intelligence it will make the students industry-ready for artificial intelligence and data science job roles. Artificial intelligence is used in wide range of industrial applications such as healthcare, transportation, entertainment, insurance, transport and logistics, and customer service.

Future applications of AI would be utilized in automated transportation, cyborg technology, solving problems associated with climate change, deep-sea and space exploration.

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

(18OE1MT02) MATHEMATICS FOR ARTIFICIAL INTELLIGENCE

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To introduce the basic concepts of probability and matrices in the field of Artificial Intelligence
- To identify, explore the complex problem-solving strategies
- To develop problem solving skills related to algorithmic analysis required for AI
- To apply and build mathematical model to solve real-world problems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explore and demonstrate practical approaches related to implementation of the AI algorithms using probability concepts
CO-2: Formulate and solve the Artificial intelligence related problems by using the knowledge of matrices and vectors
CO-3: Demonstrate the understanding of mathematical ideas from artificial intelligence perspective and machine learning
CO-4: Analyze and solve the complexity of a given problem with suitable optimization techniques

UNIT – I:
Probability: Basic rules and axioms, events, sample space, frequentist approach, dependent and independent events, conditional probability, Random variables, continuous and discrete, expectation, variance, distributions - joint and conditional, Bayes' theorem, Popular distributions - Bernoulli, Binomial, Poisson, Normal.

UNIT – II:
Descriptive Statistics & Linear Regression: Classification and tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - Central tendency and Dispersion. Simple Linear Regression Models.

UNIT – III:
Vector Space: Vectors, definition, scalars, addition, scalar multiplication, inner product (dot product), vector projection, cosine similarity, orthogonal vectors, normal and orthonormal vectors, vector norm, vector space, linear combination, linear span, linear independence, basis vectors.

UNIT – IV:
Matrices: Matrices definition, rank, System of equations: Direct methods - LU decomposition method, Tri-diagonal system; Applications of linear systems - Network flows and Mechanical systems.

UNIT – V:

Eigen Values & Eigen Vectors: Eigen values & eigen vectors, concept, intuition, significance, how to find principle component analysis, concept, properties, applications, Singular value decomposition, concept, properties, applications.

UNIT – VI:

Multivariate Calculus: Functions, Scalar derivative, partial derivatives, Gradient, chain rule, properties, method for derivative of vector-valued function with respect to scalar, vector four combinations - Jacobian, Hessian, Gradient of vector valued function, Gradient of matrices. Local/global maxima and minima, saddle point, convex functions, gradient descent algorithms - Learning rate, momentum, stochastic, Constrained optimization (Lagrange Multiplier method), convex optimization.

TEXT BOOKS:
1. Mathematics for Machine Learning, Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong, Cambridge University Press, 2020
2. Linear Algebra and it's Applications, David C. Lay, 3rd Edition, Pearson Publications
3. Probability and Statistics for Engineers, Richard A. Johanson, 5th Edition, Prentice-Hall, 1995

REFERENCES:
1. Math for Machine Learning: Open Doors to Data Science and Artificial Intelligence, Richard Han, Paperback, 2018
2. Artificial Intelligence Engines: A Tutorial Introduction to the Mathematics of Deep Learning, James V Stone
3. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester	L	T/P/D	C
	3	0	3

(18OE1CS01) FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

COURSE PRE-REQUISITES: Mathematics for Artificial Intelligence

COURSE OBJECTIVES:
- To understand and analyze the importance and basic concepts of artificial intelligence and the use of agents
- To identify, explore the complex problem-solving strategies and approaches
- To analyze the concepts of basic concepts of neural networks and learning process
- To explore and analyze the methodology used in machine learning

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the basic concepts of artificial intelligence and the use of agents into the real-world scenario
CO-2: Design and formulate complex problem solutions with the use of various searching techniques
CO-3: Correlate the algorithmic approach of machine learning algorithms for a given case study
CO-4: Analyse the phenomenon of neural networks and apply basic learning laws

UNIT – I:
Introduction to AI: Foundations of AI – History of AI - Applications of AI, Intelligent Agents – Agents and Environments – Nature of Environments – Structure of Agents – Problem solving Agents – Problem formulation – Example Problems.

UNIT – II:
Searching Techniques: Uninformed Search Strategies – Breadth first search – Depth first search – Depth limited search - Bidirectional search – comparison – Search with partial information - Heuristic search – Greedy best first search – A* search – Memory bounded heuristic search - Heuristic functions - Local search- Hill climbing – Simulated annealing search - Local beam search, Genetic algorithms.

UNIT – III:
Constraint Satisfaction Problems: Backtracking search for CSP's - local search for constraint satisfaction problem. *Adversarial search* – Games - Minimax algorithm, Alpha beta pruning, cutting-off search.

UNIT – IV:
Knowledge Representation and Reasoning: Propositional Logic, Rules of Inference, First Order Logic (FOL) Syntax, Semantics, Entailment.

UNIT – V:
Classical Planning: Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

UNIT – VI:

Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Prentice Hall, 2010
2. Machine Learning, Tom M. Mitchell, McGraw-Hill
3. Neural Networks A Comprehensive Foundation, Simon Haykin, Pearson Education, 2nd Edition, 2004

REFERENCES:

1. Artificial Intelligence, Elaine Rich & Kevin Knight, 2nd Edition, TMH
2. Artificial Intelligence-A New Synthesis, Nils J. Nilsson, Elsevier
3. Artificial Neural Networks, Yegna Narayana B., PHI

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VII Semester	L	T/P/D	C
	3	0	3

(18OE1CS02) MACHINE LEARNING TECHNIQUES

COURSE PRE-REQUISITES: Mathematics for Artificial Intelligence, Fundamentals of Artificial Intelligence

COURSE OBJECTIVES:
- To understand applications in computational learning theory
- To analyse the pattern comparison techniques

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand and Familiarize the basics concept, notations used in machine learning and mathematics behind machine learning algorithms
CO-2: Demonstrate different types of machine learning algorithms
CO-3: Apply the suitable machine learning techniques and construct a machine learning model to solve real world applications
CO-4: Evaluate model accuracy and familiarize with advanced learning algorithms

UNIT – I:
Introduction to Machine Learning: Perspectives and issues in machine learning, Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation.

UNIT – II:
Supervised Learning: Classification, decision boundaries; nearest neighbor methods, Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, Linear classifiers Bayes' Rule and Naive Baye's classification
Regression: Regression types, gradient descent; features of Over fitting and complexity; training, validation, test data, Logistic regression and applications.

UNIT -III:
Unsupervised Learning: Clustering, k-means, hierarchical, partition-based clustering, overlapping clustering, Support vector machines, Support vector regression.

UNIT -IV:
Reinforcement Learning: Introduction to Reinforcement learning, the learning task, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT- V:
Instance-Based Learning: Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT – VI:

Neural Networks: Introduction to neural networks, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and Convolution neural networks.

TEXT BOOKS:
1. Machine Learning, Tom M. Mitchell, McGraw-Hill
2. Neural Networks and Learning Machines, S. Haykin, Pearson, 2008

REFERENCES:
1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Machine Learning: The Art and Science of Algorithms that make Sense of Data, Peter Flash, Cambridge, University Press
3. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, MIT Press, 2012

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B.Tech. VIII Semester	L	T/P/D	C
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(18OE1CS03) DEEP LEARNING

COURSE PRE-REQUISITES: Mathematics for Artificial Intelligence, Fundamentals of Artificial Intelligence, Machine Learning Techniques

COURSE OBJECTIVES:
- To introduce the foundations of deep learning
- To acquire the knowledge on Deep Learning Concepts

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify and select appropriate learning network models required for real world problems
CO-2: Design an efficient model with various deep learning techniques
CO-3: Implement deep learning algorithms and solve real-world problems
CO-4: Apply optimization strategies necessary for problem solving required for large scale applications

UNIT – I:
Introduction to Deep Learning: History of Deep Learning, Deep Learning Success Stories, Biological Neuron, Idea of computational units, McCulloch Pitts Neuron, Thresholding Logic, Perceptrons, Perceptron Learning Algorithm and Convergence.

UNIT – II:
Feedforward Networks: Multilayer Perceptron, Gradient Descent, Back-propagation, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks.

UNIT – III:
Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier.

UNIT – IV:
Optimization for Training Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithm.

UNIT – V:
Convolutional Neural Networks: LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Markov Networks, Object Detection, RCNN, Fast RCNN, Faster RCNN, YOLO

UNIT – VI:

Auto-Encoders: Regularization in auto-encoders, De-noising auto-encoders, Sparse auto-encoders, Contractive auto-encoders, Structured probabilistic models of deep learning.

TEXT BOOKS:

1. Deep Learning: An MIT Press Book, Ian Goodfellow and YoshuaBengio and Aaron Courville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall

REFERENCES:

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
2. Pattern Recognition and Machine Learning, Christopher Bishop, 2007

BLOCKCHAIN TECHNOLOGIES

BLOCKCHAIN TECHNOLOGIES

The blockchain is one of the fastest growing skills in the IT sector today. This track will help the students to gain knowledge in blockchain technology, it has taken quite a turn in the industry given its popularity in providing safe and secured online transactions. Most individuals and organizations have started adopting blockchain because of the many benefits it offers to the industry today. It is used in many industry applications such as banking sector, voting, health care, real estate, the legal industry and government.

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B.Tech. V Semester

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(18OE1CS04) FUNDAMENTALS OF COMPUTER NETWORKS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To introduce the fundamental various types of computer networks
- To demonstrate the TCP/IP and OSI models with merits and demerits
- To explore the various layers of OSI model
- To introduce UDP and TCP models
- To have the concept of different routing techniques for data communications

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understand and explore the basics of Computer Networks reference models and the functionalities of physical layer

CO-2: Learn major concepts, principles involved in Data Link Layer and Network Layer

CO-3: Analyze how to maintain QoS in Network and maintaining of Congestion Control

CO-4: Demonstrate the Application Layer functionalities and importance of Security in the Network

UNIT – I:
Introduction to Networks: Internet, Protocols and Standards, The OSI Model, Layers in OSI Model, TCP/IP Suite, Addressing.
Physical Layer: Multiplexing, Transmission Media, Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT – II:
Data Link Layer: Introduction, Checksum, Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, Random Access Controlled Access, Channelization, IEEE Standards, Ethernet, Giga-Bit Ethernet, Wireless LANs, SONET-SDH, Frame Relay and ATM.

UNIT – III:
Network Layer: Logical Addressing, Internetworking, Tunneling, Address Mapping, ICMP, IGMP, Forwarding, Routing-Flooding, Bellman& Ford, Disjkstra's routing protocols, RIP, OSPF, BGP and Multicast Routing Protocols. Connecting Devices-Passive Hubs, Repeaters, Active Hubs, Bridges, Routers.

UNIT – IV:
Transport Layer: Process to Process Delivery, UDP, TCP and SCTP Protocols, Congestion, Congestion Control, Quality of Service.

UNIT – V:
Application Layer: Domain Name Space, DNS in Internet, Electronic Mail, File Transfer Protocol, WWW, HTTP, SNMP, Multi-Media.

UNIT – VI:

Network Security: Security services, mechanisms and attacks, IPSec, SSL, VPN, Firewall. Bluetooth, Zigbee, IPv4, IPv6.

TEXT BOOKS:

1. Data Communications and Networking, Behrouz A. Forouzan, 4th Edition, McGraw-Hill Education, 2006
2. Computer Networks, Andrew S. Tanenbaum, 4th Edition, Pearson Education
3. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education

REFERENCES:

1. Data Communications and Networks, William Stallings
2. Data Communication and Networks, Bhusan Trivedi, Oxford University Press, 2016
3. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education
4. Understanding Communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning

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B.Tech. V Semester	L	T/P/D	C
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(18OE1CS08) RELATIONAL DATABASE MANAGEMENT SYSTEMS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the basic concepts and the applications of database systems
- To master the basics of SQL and construct queries using SQL
- To understand the relational database design principles
- To become familiar with the basic issues of transaction processing and concurrency control
- To become familiar with database storage structures and access techniques

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the basic elements of a relational database management system
CO-2: Identify the data models for relevant problems
CO-3: Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data
CO-4: Apply normalization for the development of application software

UNIT – I:
Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems.
Introduction to Database Design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.
Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.

UNIT – II:
Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.
SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity Constraints in SQL, Triggers and Active Data bases, Designing Active Databases.

UNIT – III:
Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs, Normal Forms, Properties of

Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

UNIT – IV:
Transaction Management: Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.

UNIT – V:
Concurrency Control: Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes.
Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems.

UNIT – VI:
Storage and Indexing: Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations.
Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.
Hash- Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOKS:
1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition, McGraw-Hill Education (India) Private Limited
2. Database System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, 6th Edition, McGraw-Hill Education (India) Private Limited,
3. Database Systems, R. Elmasri, Shamkant B. Navathe, 6th Edition, Pearson Education

REFERENCES:
1. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning
2. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition
3. Database Development and Management, Lee Chao, Auerbach Publications, Taylor & Francis Group
4. Introduction to Database Systems, C. J. Date, Pearson Education

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B.Tech. VI Semester	L	T/P/D	C
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(18OE1CS05) DISTRIBUTED DATA BASES

COURSE PRE-REQUISITES: Fundamentals of Computer Networks

COURSE OBJECTIVES:
- To introduce distributed databases and exploring several algorithms for processing queries and be able to use them
- To describe the methods to translate complex conceptual data models into logical and Physical database designs
- To demonstrate query optimization and its algorithms
- To enumerate the concepts behind distributed transaction processing

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze issues related to distributed database design
CO-2: Apply Partitioning techniques to databases
CO-3: Design and develop query processing strategies
CO-4: Describe transaction processing and concurrency control in distributed databases

UNIT – I:
Introduction: Features of Distributed versus Centralized Databases,
Levels of Distribution Transparency: Reference Architecture for Distributed Databases, Types of Data Fragmentation, Distribution transparency for Read – only Applications, Distribution transparency for update Applications, Distributed database Access primitives, Integrity Constraints in Distributed Databases.

UNIT – II:
Distributed Database Design: A framework, the design of database fragmentation, the allocation of fragments.
Translation of Global Queries to Fragment Queries: Equivalence Transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

UNIT – III:
Optimization of Access Strategies: A Framework for Query Optimization, Join Queries, General Queries.

UNIT – IV:
The Management of Distributed Transactions: A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural aspects of Distributed Transactions.

UNIT – V:
Concurrency Control: Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

UNIT – VI:
Reliability: Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart.

TEXT BOOKS:
1. Principles of Distributed Database Systems, M. Tamer OZSU and PatuckValduriez, Pearson Education Asia, 2001
2. Distributed Databases, Stefano Ceri and WillipsePelagatti, McGraw-Hill

REFERENCES:
1. Database System Concepts, Henry F. Korth, A. Silberchatz and Sudershan, MGH
2. Database Management Systems, Raghuramakrishnan and JohhanesGehrke, MGH

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B.Tech. VII Semester	L	T/P/D	C
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(18OE1CS06) CRYPTOGRAPHY AND NETWORK SECURITY

COURSE PRE-REQUISITES: Fundamentals of Computer Networks, Distributed Data Bases

COURSE OBJECTIVES:
- To outline security concepts, threats, attacks, services and mechanisms
- To describe various cryptosystems- symmetric key cryptography, public key cryptography
- To apply authentication services and Secure hash functions
- To discuss the concepts of IP Security, web security, viruses and firewalls

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze the basics of security attacks, services, goals and mechanism of security
CO-2: Apply variety of cryptographic algorithms, Hash Functions and protocols underlying network security applications and authentication applications
CO-3: Examine and analyze various email security and web security mechanisms
CO-4: Understand the system level security issues

UNIT – I:
Security Attacks: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT – II:
Conventional Encryption: Classical Encryption techniques, Fiestel Cipher Structure, Data Encryption Standard, Block Cipher Design Principles and Modes of Operation, Triple DES, RC-4, Evaluation criteria for AES, AES Cipher, Placement of Encryption Function, Traffic Confidentiality.

UNIT – III:
Public Key Cryptography and Authentication: Confidentiality using Symmetric Encryption – Principles of Public key Cryptosystems, RSA algorithm, Key Management, Diffie-Hellman key Exchange, Elliptic Curve Cryptography.
Authentication requirements, Authentication functions, Message Authentication Codes

UNIT – IV:
Hash Functions: Hash Functions, Security of Hash Functions and MACs, MD5 message Digest algorithm, Secure Hash Algorithm, HMAC, Digital Signatures, Authentication Protocols, Digital Signature Standard, Authentication Applications: Kerberos, X.509 Authentication Service

UNIT – V:
Network Security: Email Security and Web Security
Electronic Mail Security – PGP/ SMIME, IP security- Architecture, Authentication Header, Encapsulating Security Payload, Key Management, Web Security- Secure Socket Layer, Transport Layer Security and Secure Electronic Transaction

UNIT – VI:
System Level Security: Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TEXT BOOKS:
1. Cryptography and Network Security – Principles and Practices, William Stallings, 4th Edition, Prentice Hall of India, 2005
2. Hack Proofing Your Network, Ryan Russell, Dan Kaminsky, Rain Forest, Puppy, Joe Grand, David Ahmad, Hal Flynn IdoDubrawsky, Steve W. Manzuik and Ryan Permeh, Wiley Dreamtech

REFERENCES:
1. Network Security Essentials: Applications and Standards, William Stallings Prentice Hall,1999, ISBN 0130160938
2. Security in Computing, Charles B. Pfleeger, Shari Lawrence Pfleeger, 3rd Edition, Pearson Education, 2003

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B.Tech. VIII Semester
L	T/P/D	C
3	0	3

(18OE1CS07) BLOCKCHAIN TECHNOLOGY

COURSE PRE-REQUISITES: Fundamentals of Computer Networks, Distributed Data Bases, Cryptography and Network Security

COURSE OBJECTIVES:
- To get the terminologies and overview of blockchain technologies
- To study the concepts and foundation of blockchain technology
- To understand security mechanism and consensus in blockchain
- To design use cases and architecture blockchain technology

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the basic concepts and characteristics of Blockchain technology
CO-2: Demonstrate key mechanisms like Decentralization, Transparency and trust, Immutability, High availability, highly secure and different types of Blockchain
CO-3: Apply the concept of Hash Function and Related Hash Algorithm to provide the security and analyze the various types of blockchains
CO-4: Understand the Crypto Currency and implement, the applications using Blockchain Technology

UNIT – I:
Introduction to Blockchain Part I: Introduction to Centralized, Decentralized and Distributed system, History of Blockchain, Various technical definitions of Blockchain.
Introduction to Blockchain Technology Part II: Generic elements of a blockchain: Block, Transaction, Peer-to-peer network, Node, Smart contract, Why It's Called "Blockchain", Characteristics of Blockchain Technology, Advantages of blockchain technology.

UNIT – II:
Concept of Blockchain Technology Part I: Cryptography, Hashing, Nonce, Distributed database, Consensus, Smart Contract, Component of block, Structure of Block chain, Technical Characteristics of the Blockchain.
Concept of Blockchain Technology Part II: Applications of blockchain technology, Tiers of blockchain technology Bolckchain 0, Bolckchain 1, Blockchain 2, Blockchain 3, Generation of Blockchain X.

UNIT – III:
Technical Foundations Part I: Cryptography, Confidentiality, Integrity, Authentication, Cryptographic primitives, Public and private keys, RSA, Discrete logarithm problem, Hash Function: Message Digest (MD), Secure Hash Algorithms (SHAs), Design of Secure Hash Algorithms (SHA), SHA-256, Design of SHA3, Elliptic Curve Digital signature algorithm.
Technical Foundations Part II: Consensus algorithm: Proof of work (PoW), Proof-of-Stake (PoS), Byzantine Fault Tolerance (BFT)

UNIT – IV:
Types of Blockchain: Public blockchains, Private blockchains, Semi-private blockchains, Side chains, Permissioned ledger, Distributed ledger, Shared ledger, Fully private and proprietary blockchains, Tokenized blockchains, Tokenless blockchains, CAP theorem and blockchain

UNIT – V:
Financial markets and trading, Trading, Exchanges, Trade life cycle, Order anticipators, Market manipulation.
Crypto Currency: Bitcoin, Bitcoin definition, Keys and addresses, Public keys in Bitcoin, Private keys in Bitcoin, Bitcoin currency units

UNIT – VI:
Implementation Platforms: Hyperledger as a protocol, Reference architecture, Hyperledger Fabric, Transaction Flow, Hyperledger Fabric Details, Fabric Membership, Fabric Membership

TEXT BOOKS:
1. Mastering Blockchain, Imaran Bashir, Second Edition, Packt
2. Blockchain Basic, Daniel Drescher, A Press

REFERENCES:
1. Blockchain For Dummies®, IBM Limited Edition, John Wiley & Sons Inc.

ROBOTICS

ROBOTICS

Robotics is a field of study that involves the design, construction and operation of robots. This field overlaps with electronics, computer science, mechatronics and artificial intelligence. Robotic companies are booming all over the world and are seeking engineers with skills for implementing **Next -Level Automation**. This Open Elective Track for Robotics consists of four courses and is intended for making students industry ready in the field of robotics.

The First course in this track" **Fundamentals of Robotics"** introduces various physical aspects of building a robot, exploring topics like how a robot perceives its environment using Sensors and how it interacts with its environment through various Actuators & Grippers. This course also inspects a variety of robot applications in different domains. Second Course in this track" **Kinematics& Dynamics of robots"** delves a level deeper discussing analysis and control of robots. It establishes strong mathematical foundation for describing and controlling robot movement. In this course students will learn in detail about Forward Kinematics, Inverse Kinematics, Workspace Analysis and Trajectory planning for robots.

Third Course in the Robotics track **"Drives and Control System for Robots"** explores in detail various Drive Mechanisms used in robotics such as Hydraulic, Pneumatic & Electric drives. After completing this course students will be able to analyze operational aspects of a drive system for a given robotic application. Fourth Course in the track **"Robot Programming and Intelligent Control System"** expands on Robot Programming, discussing various aspects of Robot Programming Languages and their functions. This course also dives deep into advanced topics like Artificial Intelligence, Neural Networks and Fuzzy control for robots.

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(18OE1EI01) FUNDAMENTALS OF ROBOTICS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the basic components of a Robot
- To learn different types of Robot sensors and actuators used in Robotics
- To identify different types of Robot grippers and their applications
- To acquire basic Knowledge on Robot kinematics
- To expose to various application fields of Robotics

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Gain knowledge about basic concepts of robots
CO-2: Appreciate the usage of different sensors and actuators in Robotics
CO-3: Select appropriate Gripping mechanism for a particular application
CO-4: Analyze the direct and the inverse kinematic problems
CO-5: Appreciate robot design deference's for various applications

UNIT – I:
Basic Concepts: An overview of Robotics, classification of Robots, Robot Components, Robot degrees of freedom, Robot Joints, Robot Coordinates, Robot reference frames, Programming modes, Robot Characteristics.

UNIT – II:
Sensors: Sensor characteristics, Position sensors, Velocity sensors, Acceleration sensors, Force and Pressure sensors, Torque sensors, Microswitches, Light and infrared sensors, Touch and tactile sensors, Proximity sensors, Range finders.

UNIT – III:
Actuators: Characteristics of actuating system, Comparison of actuating systems, Hydraulic actuators, Pneumatic devices, Electric motors, Magneto-strictive actuators, Shape-Memory Metals, Electro-active Polymer Actuators.

UNIT – IV:
Grippers: Classification of Grippers, Drive system for Grippers, Mechanical Grippers, Magnetic Grippers, Vacuum Grippers, Adhesive Grippers, Hooks and Scoops, Gripper Force analysis and design, Active and Passive Grippers.

UNIT – V:
Kinematics: Robots as Mechanisms, Matrix Representation, Homogeneous Transformation Matrices, Representation of Transformations, Inverse of Transformation Matrices, Forward and Inverse Kinematics with Equations.

UNIT – VI:

Applications: Industrial applications, material handling, processing, assembly application, inspection application, application planning, justification of robots, non-industrial applications, Robot safety.

TEXT BOOKS:

1. Introduction to Robotics: Analysis, Control, Applications, Saeed B. Niku, Wiley, 2nd Edition
2. Robotics Technology and Flexible Automation, Deb S. R., John Wiley
3. Robotics and Control, R. K. Mittal, I. J. Nagrath, McGraw-Hill Education

REFERENCES:

1. Industrial Robotics, Technology programming and Applications, Mikell P. Groover, Nicholas G. Odrey, Mitchel Weiss, Roger N. Nagel, Ashish Dutta, McGraw-Hill, 2012
2. Robotics-Control, Sensing, Vision and Intelligence, K. S. Fu, R. C. Gonzalez, C. S. G Lee, McGraw-Hill International Edition
3. Robotic Engineering–An Integrated Approach, Klafter R. D., Chimielewski T. A., Negin M., Prentice Hall of India, New Delhi, 2009

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B.Tech. VI Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1EI02) KINEMATICS AND DYNAMICS OF ROBOTS

COURSE PRE-REQUISITES: Fundamentals of Robotics

COURSE OBJECTIVES:
- To understand the basics of robot coordinate frames and their representation
- To obtain knowledge about direct kinematics and inverse kinematics for a robot manipulator
- To examine techniques for planning robot motion in a workspace
- To understand various methods for developing dynamic models for manipulator
- To learn control techniques applied to robot manipulators

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Mathematically represent a Robot system
CO-2: Calculate robot hand position and orientation for specific joint angles
CO-3: Calculate joint angles to achieve a particular hand position
CO-4: Plan trajectories for robot tool to do meaningful tasks
CO-5: Analyze different controlling techniques used for robot manipulators

UNIT – I:
Introduction: Introduction, position and orientation of objects, objects coordinate frame Rotation matrix, Euler angles Roll, pitch and yaw angles coordinate Transformations, Joint variables and position of end effector, Dot and cross products.

UNIT – II:
Direct Kinematics: Coordinate frames, Rotations, Homogeneous coordinates, Link coordinates D-H Representation, The ARM equation. Direct kinematic analysis for Four axis SCARA Robot and three, five and six axis Articulated Robots.

UNIT – III:
Inverse Kinematics: The inverse kinematics problem, General properties of solutions. Tool configuration, Inverse kinematics of four axis SCARA robot and three and five axis Articulated robot.

UNIT – IV:
Workspace Analysis and Trajectory Planning: Workspace Analysis, work envelope of a Four axis SCARA robot and five axis articulated robot workspace fixtures, the pick and place operations, Joint space technique - continuous path motion, Interpolated motion, straight line motion and Cartesian space technique in trajectory planning.

UNIT – V:
Manipulator Dynamics: Introduction, Lagrange's equation kinetic and potential energy. Link inertia Tensor, link Jacobian Manipulator inertia tensor. Gravity, Generalized forces, Lagrange-Euler Dynamic model, Dynamic model of a Two-axis planar robot, Newton Euler formulation, Lagrange - Euler formulation, problems.

UNIT – VI:

Robot Control: The Control Problem, State Equations: one axis robot; three axis SCARA robot, Constant solutions, Linear Feedback Systems, Single Axis PID Control, PD-Gravity Control.

TEXT BOOKS:

1. Fundamentals of Robotics: Analysis & Control, Robert J. Schilling, Prentice Hall of India
2. Robotics and Control, R. K. Mittal, I. J. Nagrath, McGraw-Hill Education

REFERENCES:

1. Robotic Engineering–An Integrated Approach, Klafter R. D., Chimielewski T. A., Negin M, Prentice Hall of India, New Delhi, 2009
2. Industrial Robotics, Technology Programming and Applications, Mikell P. Groover & Nicholas G. Odrey, Mitchel Weiss, Roger N. Nagel, Ashish Dutta, Tata McGraw-Hill Education, 2012
3. Robotics-Control, Sensing, Vision and Intelligence, K.S. Fu, R.C. Gonzalez, C.S.G Lee, McGraw-Hill International Edition

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B.Tech. VII Semester

	L	T/P/D	C
	3	0	3

(18OE1EI03) DRIVES AND CONTROL SYSTEM FOR ROBOTICS

COURSE PRE-REQUISITES: Fundamentals of Robotics, Kinematics and Dynamics of Robotics

COURSE OBJECTIVES:
- To get acquainted with different robot drive mechanisms
- To understand in detail, working of hydraulic and pneumatic drives used in robotics
- To learn working principles of various electric drive systems for robotics
- To acquire basic Knowledge on servo systems for robot control

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Categorize various drive systems for robot movement
CO-2: Select appropriate drive system for a particular application
CO-3: Inspect different electric drives and their applications in robotics
CO-4: Analyze accurate positioning of robot end effector by servo control

UNIT – I:
Introduction: Objectives, motivation, open loop control, closed loop control with velocity and position feedback, Types of drive systems. Functions of drive system.

UNIT – II:
Robot Drive Mechanism: Lead Screws, Ball Screws, Chain & linkage drives, Belt drives, Gear drives, Precision gear boxes, Harmonic drives, Cyclo speed reducers.

UNIT – III:
Hydraulic Drives: Introduction, Requirements, Hydraulic piston and transfer valve, hydraulic circuit incorporating control amplifier, hydraulic fluid considerations, hydraulic actuators Rotary and linear actuators. Hydraulic components in robots.

UNIT – IV:
Pneumatic Drives: Introduction, Advantages, pistons-Linear Pistons, Rotary pistons, Motors-Flapper motor, Geared motor, Components used in pneumatic control. Pneumatic proportional controller, pneumatically controlled prismatic joint.

UNIT – V:
Electric Drives: Introduction, Types, DC electric motor, AC electric motor, stepper motors, half step mode operation, micro step mode. Types of stepper motors, Direct drive actuator.

UNIT – VI:
Servo Mechanism for Robot: Mathematical modeling of robot servos, error responses and steady state errors in robot servos, feedback and feed forward compensations, hydraulic position servo, computer-controlled servo system for robot applications, selection of robot drive systems.

TEXT BOOKS:

1. Engineering Foundation of Robotics, Francis N-Nagy Andras Siegler, Prentice Hall Inc.
2. Robotics Engineering - An Integrated Approach, Richard D. Klafter, Thomas. A, ChriElewski, Michael Negin, PHI Learning, 2009

REFERENCES:

1. Industrial Robotics, Technology Programming and Applications, Mikell P. Groover & Nicholas G. Odrey, Mitchel Weiss, Roger N. Nagel, Ashish Dutta, Tata McGraw-Hill Education, 2012
2. Industrial Robotics, Bernard Hodges, 2nd Edition, Jaico Publishing House, 1993
3. Fundamentals of Robotics Analysis and Control, Robert J. Schilling, PHI Learning, 2009
4. Foundations of Robotics Analysis and Control, Tsuneo Yohikwa, MIT Press, 2003
5. Introduction to Robotics Mechanics and Control, John J. Craig, 3rd Edition, Pearson, 2008

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B.Tech. VIII Semester

	L	T/P/D	C
	3	0	3

(18OE1EI04) ROBOT PROGRAMMING AND INTELLIGENT CONTROL SYSTEM

COURSE PRE-REQUISITES: Fundamentals of Robotics, Kinematics and Dynamics of Robotics, Drives and Control Systems for Robotics

COURSE OBJECTIVES:
- To understand the fundamentals of robot programming
- To learn robot textual languages that are in common use
- To expose to artificial intelligence in robotics
- To acquire basic knowledge on neural networks in robotics
- To acquire basic knowledge on fuzzy logic in robotics

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Gain knowledge about different methods of robot programming
CO-2: Examine various robot language elements and their functions
CO-3: Analyze different AI techniques employed in robotics
CO-4: Design basic neuro-controller for robot motion control
CO-5: Apply fuzzy logic to robot control systems

UNIT – I:
Robot Programming: Methods of robot programming, leadthrough programming methods, robot program as a path in space - defining position in space, speed control, motion interpolation, WAIT, SIGNAL, DELAY commands, Branching.

UNIT – II:
Robot Languages: Textual robot language, generations of robot languages, robot language structure, operating systems, Robot language Elements and functions, constraints and variables, aggregates and location variables.

UNIT – III:
Basic Commands and Operations: Motion commands- move and related statements, speed control, points in workspace, paths and frames. End effector and sensor commands- end effector operation, sensor operation, REACT statement. Computations and operation. Program control and subroutines. Communications and data processing. Monitor mode commands.

UNIT – IV:
AI for Robotics: Introduction to Artificial Intelligence, goals of AI research, AI techniques- knowledge representation, problem representation, search techniques. LISP programming. AI and Robotics. LISP in the factory. Robotic Paradigms.

UNIT – V:
Neural Network Approach in Robotics: Introduction, Connectionist Models, Learning Principles and Learning Rules: Supervised, unsupervised, reinforcement learning. Sensor based robot learning, Neural Network in Robotics: Control of robot hands by

neural network, neural set approach to robot motion coordination, robotic motor control using reinforcement learning optimization.

UNIT – VI:

Fuzzy Logic Approach in Robotics: Introduction, Fuzzy sets, Operation of Fuzzy sets, Fuzzy relations, Fuzzy rule formation, Control rules, Fuzzy algorithm in robotics, Robot obstacle avoidance using fuzzy logic, Fuzzy logic for robot path tracking and behavior coordination, fuzzy control system in mobile robots, fuzzy controller design for robot systems, Case study of fuzzy logic in robotics.

TEXT BOOKS:

1. Industrial Robotics Technology, Programming and Applications, Mikell. P. Groover, McGraw-Hill, 2012
2. Robotics Technology and Flexible Automation, Deb S. R., Tata McGraw-Hill Publishing Company Limited

REFERENCES:

1. Design and Control of Intelligent Robotic Systems, (Studies in Computational Intelligence 177) M. Begum, F. Karray (auth.), Dikai Liu, Lingfeng Wang, Kay Chen Tan (eds.), Springer
2. Neural Networks in Robotics, Edited by George Bekey, Kenneth Y. Goldberg, Springer US, 2012
3. Neural Networks, Fuzzy Logic, Genetic Algorithm - Synthesis and Applications, Rajasekharan and Rai, PHI Publications
4. Introduction to Neural Networks using MATLAB 6.0, S. N. Sivanandam, S. Sumathi, S. N. Deepa, TMH, 2006

CYBER SECURITY

CYBER SECURITY

Cybersecurity is **important** because it incorporates everything that relates to protecting our sensitive data, personally identifiable information (PII), protected health information (PHI), personal information, intellectual property, data, and governmental and **industry** information systems from stealing and destruction endeavoured. The cyber security track helps students to learn about how to
Defend networks and data from unapproved access.
Enhanced information security and business endurance supervision.
Upgraded stakeholder confidence in your information security preparations.
Developed company authorizations with the correct security controls in place.

Some of the more common career paths in the cyber security path are
- Chief Information Security Officer. ...
- Forensic Computer Analyst. ...
- Information Security Analyst. ...
- Penetration Tester. ...
- Security Architect. ...
- IT Security Engineer. ...
- Security Systems Administrator. ...
- IT Security Consultant.

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

(18OE1CS04) FUNDAMENTALS OF COMPUTER NETWORKS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To introduce the fundamental various types of computer networks
- To demonstrate the TCP/IP and OSI models with merits and demerits
- To explore the various layers of OSI model
- To introduce UDP and TCP models
- To have the concept of different routing techniques for data communications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand and explore the basics of Computer Networks and Various Protocols and in a position to understand the World Wide Web concepts
CO-2: Administrate a network and flow of information
CO-3: Understand easily the concepts of network security, Mobile and ad-hoc networks

UNIT – I:
Introduction to Networks: Internet, Protocols and Standards, The OSI Model, Layers in OSI Model, TCP/IP Suite, Addressing.
Physical Layer: Multiplexing, Transmission Media, Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT – II:
Data Link Layer: Introduction, Checksum, Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, Random Access Controlled Access, Channelization, IEEE Standards, Ethernet, Giga-Bit Ethernet, Wireless LANs, SONET-SDH, Frame Relay and ATM.

UNIT – III:
Network Layer: Logical Addressing, Internetworking, Tunneling, Address Mapping, ICMP, IGMP, Forwarding, Routing-Flooding, Bellman& Ford, Disjkstra's routing protocols, RIP, OSPF, BGP,- and Multicast Routing Protocols. Connecting Devices-Passive Hubs, Repeaters, Active Hubs, Bridges, Routers.

UNIT – IV:
Transport Layer: Process to Process Delivery, UDP, TCP and SCTP Protocols, Congestion, Congestion Control, Quality of Service.

UNIT – V:
Application Layer: Domain Name Space, DNS in Internet, Electronic Mail, File Transfer Protocol, WWW, HTTP, SNMP, Multi-Media.

UNIT – VI:
Network Security: Security services, mechanisms and attacks, IPSec, SSL, VPN, Firewall, Bluetooth, Zigbee, IPv4, IPv6.

TEXT BOOKS:
1. Data Communications and Networking, Behrouz A. Forouzan, 4th Edition, McGraw-Hill Education, 2006
2. Computer Networks, Andrew S. Tanenbaum, 4th Edition, Pearson Education
3. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education

REFERENCES:
1. Data Communications and Networks, William Stallings
2. Data Communication and Networks, Bhusan Trivedi, Oxford University Press, 2016
3. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education
4. Understanding Communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning

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B.Tech. V Semester	L	T/P/D	C
	3	0	3

(18OE1CS08) RELATIONAL DATABASE MANAGEMENT SYSTEMS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the basic concepts and the applications of database systems
- To master the basics of SQL and construct queries using SQL
- To understand the relational database design principles
- To become familiar with the basic issues of transaction processing and concurrency control
- To become familiar with database storage structures and access techniques

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the basic elements of a relational database management system
CO-2: Identify the data models for relevant problems
CO-3: Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data
CO-4: Apply normalization for the development of application software

UNIT – I:
Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems.
Introduction to Database Design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.
Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.

UNIT – II:
Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.
SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity Constraints in SQL, Triggers and Active Data bases, Designing Active Databases.

UNIT – III:
Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs, Normal Forms, Properties of

Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

UNIT – IV:
Transaction Management: Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.

UNIT – V:
Concurrency Control: Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes.
Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems.

UNIT – VI:
Storage and Indexing: Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations.
Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.
Hash- Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOKS:
1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition, McGraw-Hill Education (India) Private Limited
2. Database System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, 6thEditio,n McGraw-Hill Education (India) Private Limited
3. Database Systems, R. Elmasri, Shamkant B. Navathe, 6th Edition, Pearson Education

REFERENCES:
1. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning
2. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition
3. Database Development and Management, Lee Chao, Auerbach Publications, Taylor & Francis Group
4. Introduction to Database Systems, C. J. Date, Pearson Education

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B.Tech. VI Semester   **L   T/P/D   C**
                                                                          3   0   3

(18OE1CS06) CRYPTOGRAPHY AND NETWORK SECURITY

COURSE PRE-REQUISITES: Fundamentals of Computer Networks, Distributed Data Bases

COURSE OBJECTIVES:
- To outline security concepts, threats, attacks, services and mechanisms
- To describe various cryptosystems- symmetric key cryptography, public key cryptography
- To apply authentication services and Secure hash functions
- To discuss the concepts of IP Security, web security, viruses and firewalls

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze the security attacks, services, goals and mechanism of security
CO-2: Develop a security model using conventional approach to prevent the attacks
CO-3: Apply public key cryptography principles, examine authenticity and integrity of the messages in the communication
CO-4: Build a model for IP security, firewall and test the security issues

UNIT – I:
Security Attacks: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT – II:
Conventional Encryption: Classical Encryption techniques, Fiestel Cipher Structure, Data Encryption Standard, Block Cipher Design Principles and Modes of Operation, Triple DES, RC-4, Evaluation criteria for AES, AES Cipher, Placement of Encryption Function, Traffic Confidentiality.

UNIT – III:
Public Key Cryptography and Authentication: Confidentiality using Symmetric Encryption – Principles of Public key Cryptosystems, RSA algorithm, Key Management, Diffie-Hellman key Exchange, Elliptic Curve Cryptography.
Authentication requirements, Authentication functions, Message Authentication Codes

UNIT – IV:
Hash Functions: Hash Functions, Security of Hash Functions and MACs, MD5 message Digest algorithm, Secure Hash Algorithm, HMAC, Digital Signatures, Authentication Protocols, Digital Signature Standard, Authentication Applications: Kerberos, X.509 Authentication Service

UNIT – V:

Network Security: Email Security and Web Security

Electronic Mail Security – PGP/ SMIME, IP security- Architecture, Authentication Header, Encapsulating Security Payload, Key Management, Web Security- Secure Socket Layer, Transport Layer Security and Secure Electronic Transaction

UNIT – VI:

System Level Security: Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TEXT BOOKS:

1. Cryptography and Network Security – Principles and Practices, William Stallings, 4th Edition, Prentice Hall of India, 2005
2. Hack Proofing your Network, Ryan Russell, Dan Kaminsky, Rain Forest, Puppy, Joe Grand, David Ahmad, Hal Flynn IdoDubrawsky, Steve W. Manzuik and Ryan Permeh, Wiley Dreamtech

REFERENCES:

1. Network Security Essentials: Applications and Standards, William Stallings, Prentice Hall,1999, ISBN 0130160938
2. Security in Computing, Charles B. Pfleeger, Shari Lawrence Pfleeger, 3rd Edition, Pearson Education, 2003

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B.Tech. VII Semester

	L	T/P/D	C
	3	0	3

(18OE1IT01) ESSENTIALS OF CYBER SECURITY

COURSE PRE-REQUISITES: Fundamentals of Computer Networks, Cryptography and Network Security

COURSE OBJECTIVES:
- To identify the key components of cyber security in network
- To describe various security levels and categories, operating system security
- To define authentication issues and network security
- To describe memory management and protection measures

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Categorize cyber-crime and an understand social, political, ethical and psychological dimensions cyber security
CO-2: Demonstrate security levels and models with objects and access control
CO-3: Analyse tools and methods used in cybercrime
CO-4: Understand Organizational Implications and security risks

UNIT – I:
Introduction to Cybercrime: Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT – II:
Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT – III:
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT – IV:
Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT – V:
Cyber Security: Organizational Implications

Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications.

UNIT – VI:
Social Media Marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOKS:
1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley India

REFERENCES:
1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press
2. Introduction to Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press T&F Group

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B.Tech. VIII Semester

L	T/P/D	C
3	0	3

(18OE1IT02) COMPUTER FORENSICS

COURSE PRE-REQUISITES: Fundamentals of Computer Networks, Cryptography and Network Security, Essentials of Cyber Security

COURSE OBJECTIVES:
- To provide an understanding of computer forensics fundamentals
- To analyze various computer forensics technologies and to provide computer forensics systems
- To identify methods for data recovery
- To apply the methods for preservation of digital evidence

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Define and discuss the concepts of computer forensics
CO-2: Explain and apply the concepts of computer investigations
CO-3: Select and apply current computer forensics tools
CO-4: Identify and apply current practices for processing crime and incident scenes

UNIT – I:
Computer Forensics Fundamentals: What is Computer Forensics? Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists.

UNIT – II:
Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

UNIT – III:
Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene — Computer Evidence Processing Steps — Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration —Practical Implementation.

UNIT – IV:
Computer Forensics Analysis and Validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network

tools, examining the honeynet project. Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.

UNIT – V:

Current Computer Forensic Tools: Evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell Phone and Mobile Device Forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT – VI:

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOKS:

1. Computer Forensics, Computer Crime Investigation, John R. Vacca, Firewall Media, New Delhi
2. Computer Forensics and Investigations, Nelson, Phillips Enfinger, Steuart, Cengage Learning
3. Real Digital Forensics, Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison Wesley, Pearson Education

REFERENCES:

1. Forensic Compiling, A Practitioners Guide, Tony Sammes and Brian Jenkinson, Springer International Edition
2. Computer Evidence Collection & Presentation, Christopher L.T. Brown, Firewall Media
3. Homeland Security, Techniques & Technologies, Jesus Mena, Firewall Media
4. Software Forensics Collecting Evidence from the Scene of a Digital Crime, Robert M. Slade, TMH 2005
5. Windows Forensics, Chad Steel, Wiley India Edition

DATA SCIENCES / BIG DATA AND ANALYTICS

DATA SCIENCES / BIG DATA AND ANALYTICS

Data science helps in risk evaluation and observing, possible deceitful comportment, payments, customer analysis, and experience, among much other exploitation. The capability to make **data**-driven choices generates a steadier financial situation and **data scientists** make the strength of the **industry.**

As such, **data science** track helps students to apply business concepts in banking, finance, manufacturing, transport, e-commerce, education, etc. that use **data science**. As a consequence, there are numerous **Data Science** Applications associated to it

Job Roles in Data Science Track

- Data Analyst
- Data Engineers
- Database Administrator
- Machine Learning Engineer
- Data Scientist
- Data Architect
- Statistician
- Business Analyst
- Data and Analytics Manager

Big Data analytics track helps the students to learn the process of gathering, establishing and examining large sets of **data** (called **Big Data**) to determine patterns and other beneficial information. Analysts occupied with **Big Data** characteristically want the acquaintance that comes from investigating the **data**.

Big data analytics is the practice of mining useful information by examining different **types** of big data sets. Big data analytics is utilized to determine concealed patterns, market developments and consumer favorites, for the advantage of organizational decision making.

Job responsibilities in a Big Data Analytics Track are

- To gather and accumulate data from disparate sources, clean it, organize it, process it, and analyse it to extract valuable insights and information.
- To identify new sources of data and develop methods to improve data mining, analysis, and reporting.
- To create data definitions for new database files or alterations made to the already existing ones for analysis purposes.
- To present the findings in reports (in table, chart, or graph format) to help the management team in the decision-making process.
- To apply statistical analysis methods for consumer data research and analysis purposes.
- To keep track of the trends and correlational patterns among complex data sets.
- To perform routine analysis tasks to support day-to-day business functioning and decision making.
- To collaborate with Data Scientists to develop innovative analytical tools.
- To work in close collaboration with both the IT team and the business management team to accomplish company goals.

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B.Tech. V Semester	**L**	**T/P/D**	**C**
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(18OE1MT03) STATISTICAL METHODS FOR DATA SCIENCE

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To provide insights about the basic roles of various statistical methods in building computer applications
- To develop a greater understanding of the importance of Data Visualization techniques
- To develop problem-solving skills
- To make inferences about the population parameters using sample data
- To provide an understanding on the importance and techniques of predicting a relationship between the two sets of data and determine the goodness of fitted model

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze an extremely large data set and perform exploratory data analysis to extract meaningful insights
CO-2: Develop various visualizations of the data in hand and communicate results of analysis effectively (visually and verbally)
CO-3: Examine a real-world problem and solve the same with the knowledge gained from various distributions study
CO-4: Use and fit a linear regression model to data and use it for prediction
CO-5: Fit a polynomial regression model to data and use it for prediction

UNIT – I:
Introduction to Statistics: Definition of statistics, basic objectives, applications in various branches of science with examples, collection of data: internal and external data, primary and secondary data, population and sample, representative sample.

UNIT – II:
Descriptive Statistics: Classification and tabulation of univariate data, graphical representation, frequency curves, descriptive measures - central tendency and dispersion, bivariate data, summarization, marginal and conditional frequency distribution.

UNIT – III:
Introduction to R: Introduction, Installing R and data types in R, programming using R: operators, conditional statements, looping, scripts, function creation, creating list, list operations, recursive list, creating a data frame, operations on data frames.

UNIT – IV:
Data Visualization using R: Import - export of data, measures of central tendency and measures of dispersion, data visualization – scatter plot, pie chart, histogram, bar chart, box plot, absolute and relative frequencies, frequency distribution.

UNIT – V:
Correlation & Linear Regression:
Correlation: Correlation, types of correlation, coefficient of correlation, rank correlation coefficient.
Linear Regression: Introduction, regression model, interval estimation, estimation of parameters of β_0 and β_1, Estimation of σ^2.

UNIT – VI:
Non-Linear Regression: Regression of second-degree polynomial (non-linear least square method for polynomial function), power function, exponential, estimation of coefficients, linear and polynomial regressions in R.

TEXT BOOKS:
1. Introductory Statistics, Thomas H. Wonnacott& Ronald J. Wonnacot, John Wiley & Sons Inc., 1969
2. Applied Statistics and Probability for Engineers, Douglas C. Montgomery, George C. Runger, 3rd Edition, John Wiley & Sons, Inc., 2003
3. R for Beginners, Sandip Rakshit, 1st Edition, McGraw-Hill Education, 2017

REFERENCES:
1. R-The Statistical Programming Language, Dr. Mark Gardner, Wiley India Pvt. Ltd, 2013
2. Introduction to the Theory of Statistics, A. M. Mood, F. A. Graybill and D. C. Boes, 3rd Edition, McGraw-Hill Education, 2017
3. Introduction of Probability Models, S. M. Ross, 11th Edition, Academic Press, N.Y., 2014
4. Statistical Methods, S. P. Gupta, 42nd Revised Edition, Sultan Chand & Sons, 2012

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B.Tech. VI Semester	L	T/P/D	C
	3	0	3

(18OE1IT03) COMPUTATIONAL THINKING USING PYTHON

COURSE PRE-REQUISITES: Statistical Methods for Data Science

COURSE OBJECTIVES:
- To understand why Python is a useful scripting language for developers
- To create and execute Python programs and to Learn how to use lists, tuples, and dictionaries in Python programs
- To learn how to build and package Python modules for reusability
- To learn how to design object-oriented programs with Python classes
- To learn how to use exception handling in Python applications for error handling

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Adapt and combine standard algorithms to solve a given problem (includes numerical as well as non-numerical algorithms)
CO-2: Adequately use standard programming constructs: repetition, selection, functions, composition, modules, aggregated data (arrays, lists, etc.)
CO-3: Explain what a given program (in Python) does identify and repair coding errors in a program
CO-4: Understand and use object-based software concepts (constructing OO software will be dealt with in the course Software Engineering)
CO-5: Use library software for (e.g.) building a graphical user interface, web application, or mathematical software

UNIT – I:
Introduction: History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator, Conditional Statements-If
If- else Nested if-else Looping for While Nested loops Control Statements Break Continue Pass String Manipulation Accessing Strings Basic Operations String slices Function.

UNIT – II:
Methods, Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods, Tuple: Introduction, Accessing tuples, Operations, Working, Functions and Methods
Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries, Properties.

UNIT – III:
Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.
Modules: Creation, Importing module, Math module, Random module, Packages.

UNIT – IV:
Composition: Input-Output-Printing on screen, Reading data from keyboard, Opening and closing file Reading and writing files, Functions.

Exception Handling: Exception, Exception Handling, Except clause, Try? Finally clause, User Defined Exceptions

UNIT – V:
OOPs Concept: Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, Regular expressions- Match function, Search function, Matching VS Searching, Modifiers, Patterns.
Multithreading: Thread, Starting a thread, Threading module, Synchronizing threads.
CGI: Introduction, Architecture, CGI environment variable, GET and POST methods, Cookies, File upload.

UNIT – VI:
Database: Introduction, Connections, Executing queries, Transactions Handling error,
Networking: Socket, Socket Module, Methods, Client and server, Internet modules, Sending email.

TEXT BOOKS:
1. Learning Python, David Ascher and Mark Lutz, O'Reilly

REFERENCES:
1. Python Programming: An Introduction to Computer Science, John M. Zelle, 2nd Edition, Kindle Edition
2. Python Essential Reference, David M. Beazley, 4th Edition, Developer's Library

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VII Semester	L	T/P/D	C
	3	0	3

(18OE1IT04) FUNDAMENTALS OF DATA MINING

COURSE PRE-REQUISITES: Statistical Methods for Data Science, Computational Thinking using Python

COURSE OBJECTIVES:
- To introduce the basic concepts and techniques in building a Data Warehouse
- To apply preprocessing methods for any given raw data
- To develop skills of using recent data mining software for solving practical problems
- To implement and apply basic algorithms for supervised and unsupervised learning

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Assess raw input data and process it to provide suitable input for a range of data mining algorithms.
CO-2: Discover and measure interesting patterns from different kinds of databases
CO-3: Evaluate and select appropriate data-mining algorithms and apply, interpret and report the output appropriately
CO-4: Design and implement data-mining applications using sample, realistic data sets and modern tools

UNIT – I:
Data Warehousing & Modeling: Basic Concepts: Data Warehousing: A multitier Architecture, Data warehouse models: Enterprise warehouse, Data mart and virtual warehouse, Extraction, Transformation and loading.

UNIT – II:
Data Cube: A multidimensional data model, Stars, Snowflakes and Fact constellations: Schemas for multidimensional Data models, Dimensions: The role of concept Hierarchies, Measures: Their Categorization and computation, Typical OLAP Operations.

UNIT – III:
Data Warehouse Implementation & Data Mining: Data Warehouse Architecture, What is data mining, Challenges, From Data Warehousing and Data Mining, Data Mining Tasks, Data Mining Functionalities, Major Issues in Data Mining. Data: Types of Data, Data Quality, Data Pre-processing, Measures of Similarity and Dissimilarity.

UNIT – IV:
Association Analysis: Association Analysis: Problem Definition, Frequent Item set Generation, Rule generation. Alternative Methods for Generating Frequent Item sets, FP-Growth Algorithm, Evaluation of Association Patterns.

UNIT – V:
Classification: Decision Trees Induction, Method for Comparing Classifiers, Rule Based Classifiers, Nearest Neighbor Classifiers, Bayesian Classifiers.

UNIT – VI:

Clustering Analysis: Overview, K-Means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation, Density-Based Clustering, Graph- Based Clustering, Scalable Clustering Algorithms.

TEXT BOOKS:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, First Impression, Pearson, 2014
2. Data Mining-Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, 3rd Edition, Morgan Kaufmann, 2012

REFERENCES:

1. Data Warehousing in the Real World, Sam Anahory, Dennis Murray, Tenth Impression, Pearson, 2012
2. Mastering Data Mining, Michael J. Berry, Gordon S. Linoff, 2ndEdtion, Wiley, 2012

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B.Tech. VIII Semester	L	T/P/D	C
	3	0	3

(18OE1IT05) DATA ANALYSIS AND VISUALIZATION

COURSE PRE-REQUISITES: Statistical Methods for Data Science, Computational Thinking using Python, Fundamentals of Data Mining

COURSE OBJECTIVES:
- To introduce concept and characteristics of probability distribution
- To introduce underlying design principles, properties and assumptions of linear and non-linear regression modelling
- To introduce design principles involved in identifying interesting classification and prediction of data patterns
- To introduce properties of time series data and perform time series analysis

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply probability distribution concepts to identify univariate data patterns
CO-2: Apply regression modelling to build efficient mathematical models for prediction and classification
CO-3: Apply decision and regression trees for supervised learning
CO-4: Visualize time series data by applying time series techniques

UNIT – I:
Data Definitions and Analysis Techniques: Elements, Variables, and Data categorization, Introduction to statistical learning, Descriptive Statistics: Measures of central tendency, Measures of location of dispersions.

UNIT – II:
Basic Analysis Techniques: Basic analysis techniques, Statistical hypothesis generation and testing, Chi-Square test, t-Test Analysis of variance, Correlation analysis, Maximum likelihood test.

UNIT – III:
Data Analysis Techniques: Regression analysis and visualization, Classification techniques and visualization, Clustering and visualization, Association rules analysis and visualization

UNIT – IV:
Time-Series Analysis and Forecasting: Time-series components, Variation in Time Series, Cyclic Variation, Seasonal Variation, Irregular Variation.

UNIT – V:
Smoothing Techniques: A problem involving all four components of time series, Introduction to forecasting, forecasting models, Trend and Seasonal effects, Trend Analysis

UNIT – VI:

Case-studies and Projects: Understanding business scenarios, Feature engineering and visualization, Sensitivity Analysis.

TEXT BOOKS:

1. Data Mining and Analysis, Mohammed J. Zaki, Wagner Meira, Cambridge, 2012
2. Data Mining: Theories, Algorithms, and Examples, Nong Ye, CRC Press Taylor & Francis Group, 2014
3. Statistics for Management, David S. Rubin, Sanjay Rastogi, Masood Husain Siddiqui Richard I. Levin, 7th Edition, Pearson Learning

REFERENCES:

1. Probability & Statistics for Engineers & Scientists, Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, 9th Edition, Prentice Hall Inc.
2. The Elements of Statistical Learning, Data Mining, Inference and Prediction, Trevor Hastie, Robert Tibshirani, Jerome Friedman, 2nd Edition, Springer, 2014
3. An Introduction to Statistical Learning Mining Massive Data Sets, A. Rajaraman and J. Ullman, Cambridge University Press, 2012
4. Software for Data Analysis: Programming with R (Statistics and Computing), John M. Chambers, Springer

AUTONOMOUS VEHICLES

AUTONOMOUS VEHICLES

The invention of the wheel marked a large step in the evolution of mankind. With mobility, man experienced a newfound freedom that opened the doors for several other inventions. Automobile engineering or automotive engineering is one of the most challenging careers in the field of engineering with a wide scope. This branch deals with the designing, developing, manufacturing, testing and servicing automobiles such as cars, trucks, motorcycles, scooters, etc. and the related engineering sub systems. For the perfect blend of designing and manufacturing automobiles, automobile engineering uses the features of different elements of engineering such as mechanical, electrical, electronic, instrumentation, civil, software and safety engineering. Exploring the topic from an interdisciplinary perspective is indispensable. Globalization and incredible growth of automobile industry have resulted in numerous opportunities for engineers both in India and abroad.

The 17th and 18th centuries were mostly about steam-powered vehicles transporting people and goods. While electric cars enjoyed popularity in the 19th and early 20th centuries, the later period saw the accelerated adoption of the petrol car, due to its advantages of power, mass production, cost and advances in the internal combustion engine. It is only in the 21st century that interest in electric cars has come back, given the need for cleaner, greener modes of transport. The modern period is associated with several path breaking technologies. Over the last couple of decades, there has been an explosion of electronics in vehicles. Connected cars that include technology features are ever more popular. These smart cars come with internet access, GPS, wi-fi, superior infotainment, advanced telematics and navigation capabilities. More innovations in in-vehicle infotainment and electronics promise to give car users even more enhanced capabilities in the near future.

Today, safety has become a larger concern than ever before. While entertainment and infotainment have made car driving a pleasure, this has also given rise to a growing tribe of distracted drivers. Add to this, underdeveloped roads, which take a toll on drivers today. Increased distractions and fatigue can also contribute to human fatalities. The future certainly points in the direction of driverless cars, which promise to alleviate concerns of traffic congestion and road safety. Driverless cars, also known as autonomous cars, will usher in a paradigm shift in the evolution of the modern automobile. Self-driving cars can sense the environment and traffic with the help of RADAR, LIDAR, GPS and computer vision and navigate without human intervention. Autonomous cars are claimed to have greater accuracy, reliability and faster reaction time compared to human drivers. This would lead to fewer traffic collisions and less road congestion.

Autonomous driving is a popular subject of today's discussion and automakers are developing complex systems that allow cars to drive themselves. If technology continues on its current course, car will do the concentrating for you. Self-parking, automatic emergency braking, adaptive cruise control and lane keeping are just some of the technologies that have leapt into the market in the past few years. Put them all together, get a picture of driving to assisted driving to fully autonomous cars. The open elective track "Autonomous Vehicles" offered by the department of automobile engineering trains the students to meet the technological challenges and diverse needs of the industry and society in various areas of automobile engineering and equips them to excel in a truly competitive industry. With through knowledge in this filed, engineering graduates get opportunity to serve many top-notch automobile companies and IT companies as well.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester

L	T/P/D	C
3	0	3

(18OE1AE01) PRINCIPLES OF AUTOMOBILE ENGINEERING

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the layout of an automobile and functionalities subsystems
- To provide overview on concepts of engine, cooling, lubrication and fuel systems
- To present constructional features and working of automotive driveline and running systems
- To study the fundamentals and principles of automotive electrical systems

COURSE OUTCOMES After completion of the course, the student should be able to
CO-1: Explain the functionalities of automotive systems and subsystems
CO-2: Give an overview on engine and engine subsystems.
CO-3: Describe working of automotive driveline and running systems
CO-4: Discuss the concepts of automotive starting, ignition and charging systems

UNIT – I:
Introduction: Classification of automobiles, layout of an automobile, automobile sub systems and their role. Types of chassis, role and requirement of a chassis frame, types of frames, materials, loading points and types of bodies.

UNIT – II:
Engine: Classification and components of an engine, principle and working of four stoke and two stroke SI and CI engines, petrol fuel system - carburetor, diesel fuel system - diesel fuel pump, injectors, introduction to electronic fuel injection system – MPFI and CRDI.

UNIT – III:
Cooling and Lubrication: Necessity of cooling, air-cooling, water cooling - thermosyphon and pump cooling, radiator, pump, thermostat, antifreeze solution and radiator fan. Mist, splash and forced lubrication, oil filters and oil pumps.

UNIT – IV:
Drive Line: Clutches, principle, single plate clutch, multi plate clutch and centrifugal clutch. Gear box - Need, sliding mesh, constant mesh and synchromesh gear box. Propeller shaft, universal joint, differential, wheels and tyres.

UNIT – V:
Running Systems: Suspension systems – Objective, rigid axle and independent suspension system and torsion bar. Steering system – Layout, steering mechanism, steering geometry and steering gear boxes. Brake system –Principle, stopping distance, types of brakes and actuation.

UNIT – VI:

Electrical Systems: Starting system - Principle, working of different starter drive units and solenoid switches. Ignition system **-** Conventional ignition system types, ignition advance and retarding mechanisms. Charging system – Alternator principle, construction and working, cut-outs and regulators.

TEXT BOOKS:

1. Advanced Vehicle Technology, Heinz Heisler, Butterworth Heinemann Publishers, 2002
2. Automobile Electrical Equipment, Crouse W. H., 3rdEdition, McGraw-Hill Book Co., Inc., New York,1986

REFERENCES:

1. Motor Vehicle, Garrett T. K., Newton K. and Steeds W. ButterWorths& Co. Publishers Ltd., New Delhi, 2001
2. Automotive Electrical Equipment, Kohli P. L., Tata McGraw-Hill Co., Ltd., New Delhi, 1975
3. Automotive Chassis and Body, Crouse W. H., McGraw-Hill Book Co., 5thEdition, 1976
4. Automotive Mechanics, Giri N. K., Khanna Publications, 2006

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester

L	T/P/D	C
3	0	3

(18OE1AE02) MODERN AUTOMOTIVE TECHNOLOGIES

COURSE PRE-REQUISITES: Principles of Automobile Engineering

COURSE OBJECTIVES:
- To provide an overview on advanced engine control system concepts
- To know the interdisciplinary concepts and intelligent automotive systems
- To understand the interdisciplinary concepts and GPS-enabled applications in automobile
- To present intelligent vehicle technologies like comfort, safety and security systems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply advanced engine control system concepts in engineering
CO-2: Discuss the need for implementation intelligent vehicle technologies
CO-3: Address the key technologies in automotive navigation
CO-4: Appreciate the technological advancements driver assistance systems

UNIT – I:
Advanced Engine Controls: Concept of an electronic engine control system, engine control module, powertrain control module, electronic fuel injection - throttle body fuel injection, multi-point fuel injection, gasoline direct injection, common rail direct injection, electronic ignition control, engine mapping, on-board diagnostics.

UNIT – II:
Introduction to Intelligent Vehicles: Driver information, driver perception, driver convenience, driver monitoring, general vehicle control, longitudinal and lateral control, collision avoidance, vehicle monitoring.

UNIT – III:
Telematics: Global positioning system, geographical information systems, navigation system, architecture, automotive vision system, road recognition.

UNIT – IV:
Comfort Systems: Adaptive cruise control system, active suspension system, power steering, collapsible and tiltable steering column, power windows.

UNIT – V:
Safety Systems: Active and passive safety, airbags, seat belt tightening system, forward collision warning systems, child lock, anti-lock braking systems, traction control system, lane departure warning system.

UNIT – VI:
Security Systems: Anti-theft technologies – mechanical, electromechanical and electronic immobilizers, alarm system, stolen vehicle tracking system, remote keyless entry, smart card system, number plate coding.

TEXT BOOKS:
1. Understanding Automotive Electronics, William B. Ribbens, 5th Edition, Butterworth Heinemann Woburn,1998
2. Intelligent Vehicle Technologies: Theory and Applications, LjuboVlacic, Michel Parent and Fumio Harashima, Butterworth-Heinemann Publications, Oxford, 2001

REFERENCES:
1. Automotive Handbook, Robert Bosch, 5th Edition, SAE, 2000
2. Navigation and Intelligent Transportation Systems – Progress in Technology, Ronald K. Jurgen, Automotive Electronics Series, SAE, USA, 1998
3. Understanding Automotive Electronics, Bechhold, SAE, 1998

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B.Tech. VII Semester	L	T/P/D	C
	3	0	3

(18OE1AE03) ELECTRIC, HYBRID AND FUEL CELL VEHICLES

COURSE PRE-REQUISITES: Principles of Automobile Engineering, Modern Automotive Technologies

COURSE OBJECTIVES:
- To study the concepts and drivetrain configurations of electric and hybrid vehicles
- To understand about electric propulsion system
- To provide various energy storage devices
- To present principle, working and automotive applications of fuel cell and solar technology

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain the concepts and drivetrain configurations of electric and hybrid vehicles
CO-2: Discuss various electric motors and controls
CO-3: Present various energy storage devices
CO-4: Describe automotive applications of fuel cell and solar technology

UNIT – I:
Electric Vehicles: Layout of an electric vehicle, system components, traction motor characteristics, transmission, electronic control system, advantage and limitations, performance and energy consumption of electric vehicles.

UNIT – II:
Hybrid Vehicles: Concepts of hybrid electric drivetrain based on hybridization and powertrain configuration, architecture of series, parallel and series-parallel hybrid electric drivetrains, modes of operation, merits and demerits, plug-in hybrid architecture, speed and torque coupling of hybrid electric drivetrains.

UNIT – III:
Electric Motors: Review of technology suited to automotive propulsion, requirements, DC motors, Induction motors, permanent magnet brushless DC motors and switched reluctance motors.

UNIT – IV:
Motor Drives: Speed and torque control, DC motor - Chopper based four quadrant operations, induction motor, permanent magnet motor and switched reluctance motor.

UNIT – V:
Energy Storages: Electromechanical batteries - Types, parameters, lead acid batteries, nickel-based batteries, lithium-based batteries, battery management system and ultracapacitors.

UNIT – VI:

Fuel Cell and Solar Vehicles: Fuel cell vehicle – Operating principle, types of fuel cells, fuel cell options for fuel cell vehicle and fuel cell hybrid vehicle. Solar vehicle - Solar photovoltaic cell, solar array, solar car electrical system and drive train.

TEXT BOOKS:

1. Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay and Ali Emadi, CRC Press, 2004
2. Electric Vehicle Technology-Explained, James Larminie and John Loury, John Wiley & Sons Ltd., 2003

REFERENCES:

1. Electric and Hybrid Vehicles – Design Fundamentals, Iqbal Husain, CRC Press, 2010
2. Electric Vehicle Battery Systems, Sandeep Dhameja, Butterworth–Heinemann, 2002
3. Electric and Hybrid – Electric Vehicles, Ronald K. Jurgen, SAE, 2002
4. Light Weight Electric/Hybrid Vehicle Design, Ron Hodkinson and John Fenton, Butterworth–Heinemann

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B.Tech. VIII Semester

L	T/P/D	C
3	0	3

(18OE1AE04) CONNECTED AND AUTONOMOUS VEHICLES

COURSE PRE-REQUISITES: Principles of Automobile Engineering, Modern Automotive Technologies, Electric, Hybrid and Fuel Cell Vehicles

COURSE OBJECTIVES:
- To understand the fundamentals of vehicle communication and networking
- To provide state-of-the-art in wireless communication technology within and between vehicles
- To know various levels of vehicle autonomy and intelligent automotive systems
- To provide an overview on driver-assist and self-driving processes

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Present the fundamentals of vehicle communication and networking
CO-2: Appreciate intra-vehicle and inter-vehicle communication technologies
CO-3: Describe various levels of vehicle autonomy
CO-4: Discuss the driver-assist and self-driving processes

UNIT – I:
Introduction to Vehicle Communications: Intra-vehicle communications - communications protocols, systems and sensors (Braking, steering, power train, chassis systems, body electronics, instrument clusters, infotainment systems), inter-vehicle communications - cooperative driving (accident warning, frontal/rear collision prevention, lane change, assistance). Consumer assistance – traffic information, multimedia support and smart parking

UNIT – II:
Communication Fundamentals and Controller Area Network: Communication fundamentals – Frequency, bandwidth, power measurement, signal to noise ratio, transmission rate constraints, radio frequency spectrum allocation, RADAR operation and types of RADAR. CAN evolution, versions, types of controllers, layered architecture. CAN bus, message frames and error handling.

UNIT – III:
Intra-Vehicle Communications: Wired communication – Network comparison, two tier approach, LIN applications - Localized vehicle area support, general support areas, CAN applications - In vehicle operation, infotainment, wireless communication – Bluetooth vehicle applications, satellite services – satellite radio, vehicle care and traffic status.

UNIT – IV:
Inter-Vehicle Communication: Adhoc Communications –Applications in Vehicle traffic Monitoring, Collision and congestion avoidance, Highway lane reservation, Emission Control, Vehicle Frequency Utilization – AM Radio, Bluetooth, FM Radio, GPS, Short range RADAR, Wireless LAN, Intelligent Roadway-Infrastructure to vehicle and

vehicle to vehicle communications. Evolving smart vehicle – ECU, wireless networking, forward RADAR, side RADAR, GPS, cellular transmission and event Recorder.

UNIT – V:
Autonomous Vehicles: Importance, levels of automation, policy making, social costs, safety and crashes, congestion, land use, energy and emissions, costs and disadvantages

UNIT – VI:
Current State of Autonomous Vehicles: Research, challenges, commercial development, sensor systems, sensor suits, environmental challenges, graceful degradation, V2V and V2I communication, sharing the drive, integrity, security, verification and policy implications.

TEXT BOOKS:
1. Inter and Intra Vehicle Communications, Gilbert Held Auerbach Publications, 2008
2. Autonomous Vehicle Technology-A Guide for Policymakers, James M. Anderson, Nidhi Kalra, Karlyn D. Stanley, Paul Sorensen, Constantine Samaras, Oluwatobi A. Oluwatola, RAND Corporation, Santa Monica, Calif., 2016
3. Autonomous Driving - Technical, Legal and Social Aspects, Markus Maurer, J. Christian Gerdes, Barbara Lenz, Hermann Winner, Editors, Springer, 2016

REFERENCES:
1. Intelligent Vehicle Technologies: Theory and Applications, LjuboVlacic, Michel Parent and Fumio Harashima, Butterworth-Heinemann Publications, Oxford, 2001
2. Navigation and Intelligent Transportation Systems – Progress in Technology, Ronald K. Jurgen, Automotive Electronics Series, SAE, USA, 1998
3. Automotive In–vehicle Networks, J. Gabrielleen, Wiley-Blackwell, 2008
4. In-Vehicle Network Architecture for the Next-Generation Vehicles, Syed Masud Mahmud, IGI
5. Communication Technologies for Vehicles, Mohamed Kassab Springer, 2015

GENERAL - COMPUTING

1. PROGRAMMING THROUGH JAVA

Java is an extensively **used** programming language specifically intended for use in the distributed environment of the internet. **Java** help students to create wide-ranging applications that possibly will run on a single workstation or be distributed among servers and clients in a network.

Java is an extremely fruitful language and an upper option for many developers for many years. The motive that it has remained so prevalent is since it still happens the needs of functioning across networks.

Students will have different roles and responsibilities by learning Java Programming

- Designing, implementing, and maintaining Java applications that are often high-volume and low-latency, required for mission-critical systems.
- Delivering high availability and performance.
- Contributing in all phases of the development lifecycle.
- Writing well-designed, efficient, and testable code.

2. RELATIONAL DATABASE MANAGEMENT SYSTEMS

A relational database permits you to effortlessly find precise information. It also consents you to sort based on any field and produce reports that comprise only definite fields from each record. With features like, Data Accuracy, Easy Access to Data, Data Integrity, Flexibility, Normalization, High Security, Feasible for Future Modifications

By learning RDBMS Students will have different roles in Database environment

- Data Administrator,
- Database Administrator
- Database Designer
- Application Programmer

3. COMPUTATIONAL THINKING USING PYTHON

The **python** language is one of the utmost accessible programming languages available because it has streamlined syntax and not complex, which gives more importance on natural language. Due to its comfort of learning and practice, **python** codes can be readily written and executed much quicker than former programming languages.

Data Science: The libraries and frameworks Python offers, e.g.PyBrain, PyMySQL, and NumPy are one of the big reasons. Another reason is diversity. Python experience allows you to do a lot more than any other language, e.g. you can create scripts to automate stuff, go into web development, and so much more.

Students will have various Job Profiles by learning Python

- Software Engineer.
- Python Developer.
- Research Analyst.
- Data Analyst.
- Data Scientist.
- Software Developer.

4. INTRODUCTION TO DATA ANALYTICS

Data Scientists and Analysts **use data analytics** techniques in their research, and businessesalso **use** it to inform their conclusions. **Data analysis** can assistance corporations healthier comprehend theircustomers, assess their ad-campaigns, personalize gratified, create content approaches and progress products.

By learning Data Analytics students will get Jobs with different designations

- IT Systems Analyst. Systems analysts use and design systems to solve problems in information technology. ...
- Healthcare Data Analyst. ...
- Operations Analyst. ...
- Data Scientist. ...
- Data Engineer. ...
- Quantitative Analyst. ...
- Data Analytics Consultant. ...
- Digital Marketing Manager.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech.

	L	T/P/D	C
	3	0	3

(18OE1IT06) PROGRAMMING THROUGH JAVA

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To introduce object-oriented programming concepts using the Java language
- To introduce the principles of inheritance and polymorphism; and demonstrates how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce exception handling, event handling and multithreading

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Develop applications for range of problems using object-oriented programming techniques
CO-2: Design simple graphical user interface applications
CO-3: Explore the design of graphical user interface using applets and swings

UNIT – I:
Object Oriented Thinking and Java Basics: Need for OOP Paradigm, Summary of OOP Concepts, Coping with Complexity, Abstraction Mechanisms, A Way of Viewing World – Agents, Responsibility, Messages, Methods, History of Java, Java Buzzwords, Data Types, Variables, Scope and Life Time of Variables, Arrays, Operators, Expressions, Control Statements, Type Conversion and Casting, Simple Java Program, Concepts of Classes, Objects, Constructors, Methods, Access Control, This Keyword, Garbage Collection, Overloading Methods and Constructors, Method Binding, Inheritance, Overriding and Exceptions, Parameter Passing, Recursion, Nested and Inner Classes, Exploring String Class.

UNIT – II:
Inheritance, Packages and Interfaces: Hierarchical Abstractions, Base Class Object, Subclass, Subtype, Substitutability, Forms of Inheritance- Specialization, Specification, Construction, Extension, Limitation, Combination, Benefits of Inheritance, Costs of Inheritance. Member Access Rules, Super Uses, Using Final with Inheritance, Polymorphism- Method Overriding, Abstract Classes, The Object Class.
Defining, Creating and Accessing a Package, Understanding Classpath, Importing Packages, Differences between Classes and Interfaces, Defining an Interface, Implementing Interface, Applying Interfaces, Variables in Interface and Extending Interfaces, Exploring Java.IO.

UNIT – III:
Exception Handling and Multi-threading: Concepts of Exception Handling, Benefits of Exception Handling, Termination or Resumptive Models, Exception Hierarchy, Usage of Try, Catch, Throw, Throws and Finally, Built in Exceptions, Creating Own Exception Sub Classes.
String Handling, Exploring Java. Util, Differences between Multi-Threading and Multitasking, Thread Life Cycle, Creating Threads, Thread Priorities, Synchronizing

Threads, Interthread Communication, Thread Groups, Daemon Threads. Enumerations, Autoboxing, Annotations, Generics.

UNIT – IV:
Event Handling: Events, Event Sources, Event Classes, Event Listeners, Delegation Event Model, Handling Mouse and Keyboard Events, Adapter Classes.
The AWT Class Hierarchy, User Interface Components- Labels, Button, Canvas, Scrollbars, Text Components, Check Box, Check Box Groups, Choices, Lists Panels – Scrollpane, Dialogs, Menubar, Graphics, Layout Manager – Layout Manager Types – Border, Grid, Flow, Card and Grid Bag.

UNIT – V:
Applets: Concepts f Applets, Differences between Applets and Applications, Life Cycle of an Applet, Types of Applets, Creating Applets, Passing Parameters to Applets.

UNIT – VI:
Swing: Introduction, Limitations of AWT, MVC Architecture, Components, Containers, Exploring Swing- Japplet, Jframe and Jcomponent, Icons and Labels, Text Fields, Buttons – The Jbutton Class, Check Boxes, Radio Buttons, Combo Boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:
1. Java The Complete Reference, Herbert Schildt, 7th Edition, TMH
2. Understanding OOP with Java Updated Edition, T. Budd, Pearson Education
3. An Introduction to Programming and OO Design using Java, J. Nino and F. A. Hosch, John Wiley & Sons

REFERENCES:
1. Introduction to Java Programming, Y. Daniel Liang, Pearson Education
2. An Introduction to Java Programming and Object-Oriented Application Development, R. A. Johnson, Thomson
3. Core Java 2, Vol. 1 - Fundamentals, Cay. S. Horstmann and Gary Cornell, 8th Edition, Pearson Education
4. Core Java 2, Vol. 2 - Advanced Features, Cay. S. Horstmann and Gary Cornell, 8th Edition, Pearson Education

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech.	L	T/P/D	C
	3	0	3

(18OE1CS08) RELATIONAL DATABASE MANAGEMENT SYSTEMS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the basic concepts and the applications of database systems
- To master the basics of SQL and construct queries using SQL
- To understand the relational database design principles
- To become familiar with the basic issues of transaction processing and concurrency control
- To become familiar with database storage structures and access techniques

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the basic elements of a relational database management system
CO-2: Ability to identify the data models for relevant problems
CO-3: Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data
CO-4: Apply normalization for the development of application software

UNIT – I:
Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems.
Introduction to Database Design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.
Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.

UNIT – II:
Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.
SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity Constraints in SQL, Triggers and Active Data bases, Designing Active Databases.

UNIT – III:
Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs, Normal Forms, Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

UNIT – IV:
Transaction Management: Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.

UNIT – V:
Concurrency Control: Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes.
Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems.

UNIT – VI:
Storage and Indexing: Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations.
Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.
Hash- Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOKS:
1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition, McGraw-Hill Education (India) Private Limited
2. Database System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, 6th Edition, McGraw-Hill Education (India) Private Limited
3. Database Systems, R. Elmasri, Shamkant B. Navathe, 6th Edition, Pearson Education

REFERENCES:
1. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning
2. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition
3. Database Development and Management, Lee Chao, Auerbach Publications, Taylor & Francis Group
4. Introduction to Database Systems, C. J. Date, Pearson Education

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech.	L	T/P/D	C
	3	0	3

(18OE1IT03) COMPUTATIONAL THINKING USING PYTHON

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
* To understand why Python is a useful scripting language for developers
* To create and execute Python programs and to Learn how to use lists, tuples, and dictionaries in Python programs
* To learn how to build and package Python modules for reusability
* To learn how to design object-oriented programs with Python classes
* To learn how to use exception handling in Python applications for error handling

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Adapt and combine standard algorithms to solve a given problem (includes numerical as well as non-numerical algorithms)
CO-2: Adequately use standard programming constructs: repetition, selection, functions, composition, modules, aggregated data (arrays, lists, etc.)
CO-3: Explain what a given program (in Python) does identify and repair coding errors in a program
CO-4: Understand and use object-based software concepts (constructing OO software will be dealt with in the course Software Engineering)
CO-5: Use library software for (e.g.) building a graphical user interface, web application, or mathematical software

UNIT – I:
Introduction: History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator, Conditional Statements-If
If- else Nested if-else Looping for While Nested loops Control Statements Break
Continue Pass String Manipulation Accessing Strings Basic Operations String slices Function.

UNIT – II:
Methods, Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods, Tuple: Introduction, Accessing tuples, Operations, Working, Functions and Methods
Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries, Properties.

UNIT – III:
Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.
Modules: Creation, Importing module, Math module, Random module, Packages.

UNIT – IV:
Composition: Input-Output-Printing on screen, Reading data from keyboard, Opening and closing file Reading and writing files, Functions.

Exception Handling: Exception, Exception Handling, Except clause, Try? Finally clause, User Defined Exceptions

UNIT – V:
OOPs Concept: Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, Regular expressions- Match function, Search function, Matching VS Searching, Modifiers, Patterns.
Multithreading: Thread, Starting a thread, Threading module, Synchronizing threads.
CGI: Introduction, Architecture, CGI environment variable, GET and POST methods, Cookies, File upload.

UNIT – VI:
Database: Introduction, Connections, Executing queries, Transactions Handling error,
Networking: Socket, Socket Module, Methods, Client and server, Internet modules, Sending email.

TEXT BOOKS:
1. Learning Python, David Ascher and Mark Lutz, 2nd Edition, O'Reilly, 2003

REFERENCES:
1. Python Programming: An Introduction to Computer Science, John M. Zelle, 2nd Edition, Kindle Edition
2. Python Essential Reference, David M. Beazley, 4th Edition, Developer's Library

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B.Tech.	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1IT07) INTRODUCTION TO DATA ANALYTICS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To be exposed to conceptual framework of big data
- To understand different techniques of data analysis
- To be familiar with concepts of data streams
- To be exposed to item sets, clustering, frame works and Visualization

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand big data fundamentals
CO-2: Learn various data analysis techniques
CO-3: Implement various data streams
CO-4: Understand item sets, clustering, frame works & Visualizations

UNIT – I:
Introduction to Big Data: Introduction to Big Data Platform – Challenges of Conventional systems – Web data – Evolution of Analytic scalability, analytic process and tools, Analysis vs Reporting – Modern data analytic tools,
Statistical Concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT – II:
Data Analysis: Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and Kernel methods
Analysis of Time Series: Linear systems analysis, nonlinear dynamics – Rule induction –
Neural Networks: Learning and and Generalisation, competitive learning, Principal component analysis and neural networks
Fuzzy Logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT – III:
Mining Data Streams: Introduction to Streams Concepts – Stream data model and architecture – Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a Window – Decaying window – Real time Analytics Platform (RTAP) applications – case studies – real time sentiment analysis, stock market predictions.

UNIT – IV:
Frequent Itemsets and Clustering: Mining Frequent itemsets – Market based Modeling – Apriori Algorithm – Handling large data sets in Main Memory – Limited Pass Algorithm – Counting frequent itemsets in a Stream – Clustering Techniques – Hierarchical – K-Means.

UNIT – V:
Clustering high dimensional data – CLIQUE and ProCLUS – Frequent pattern-based clustering methods – Clustering in non-Euclidean space – Clustering for streams and Parallelism.

UNIT – VI:
Frameworks and Visualization: MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases – S3 – Hadoop Distributed file systems – Visualizations – Visual data analysis techniques,
Interaction Techniques: Systems and Applications

TEXT BOOKS:
1. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007
2. Mining of Massive Datasets, Anand Rajaraman and Jeffrey David Ullman, Cambridge University Press, 2012

REFERENCES:
1. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, John Wiley & Sons, 2012
2. Big Data Glossary, Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, Pete Warden, O'Reilly, 2011
3. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, 2nd Edition, Elsevier, 2008

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B.Tech.	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18OE1CS11) FUNDAMENTALS OF COMPUTER ALGORITHMS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To reinforce algorithms analysis methods
- To analyse running time of an algorithm
- To understand different algorithm design strategies
- To familiarize with an assortment of important algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply algorithm design techniques and concepts to solve given engineering problem
CO-2: Analyze running times of algorithms using asymptotic analysis
CO-3: Develop efficient algorithms for computational tasks
CO-4: Computing complexity measures of algorithms

UNIT – I:
Introduction: Characteristics of algorithm. Analysis of algorithms: Asymptotic analysis of complexity bounds – best, average and worst-case behaviour; Performance measurements of Algorithm, Time and space trade-offs.

UNIT – II:
Divide and Conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication. Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT – III:
Greedy Method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem, Huffman Codes.

UNIT – IV:
Dynamic Programming-I: General method, Principle of optimality, applications-Multistage graphs, Matrix chain multiplication, Optimal binary search trees.

UNIT – V:
Dynamic Programming-II: 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT – VI:
Backtracking: General method, applications- N-Queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

TEXT BOOKS:
1. Fundamentals of Computer Algorithms, E. Horowitz et al., Galgotia Publications
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Lieserson, Ronald L. Rivest and Clifford Stein, 4th Edition, MIT Press/McGraw-Hill

REFERENCES:
1. Algorithm Design, Jon Kleinberg and EvaTardos, 1st Edition, Pearson
2. Algorithm Design: Foundations, Analysis and Internet Examples, Michael T. Goodrich and Roberto Tamassia, Second Edition, Wiley
3. Algorithms – A Creative Approach, Udi Manber, 3rd Edition, Addison-Wesley, Reading, MA
4. Introduction to the Design and Analysis of Algorithms, Anany Levitin, 3rd Edition, Pearson Publications

GENERAL

PROFESSIONAL ETHICS AND HUMAN VALUES

Ethics is a necessary and listed Graduate Attribute for all engineers according to the Washington Accord. As engineers deal with the society and provide for the society, it is important that the ethical concerns pertaining to technology are well-understood and addressed. Human Values form the basis for all Ethics and ethical theories help resolve professional dilemmas too. This course aims to create an appreciation for normative and applied ethics with special focus on professionalism and technology education and practice. Given the diverse set of roles an engineer or computer scientist may play in the society, there is an inherent societal need for engineers, technologists, and computer scientists to be ethical. The formative years of students of engineering are the best time to impress upon them the practical importance and application aspects of ethics. The curriculum is designed to include an inherent appreciation for the Indian Ethos and cover a wide variety of topics with suitable case studies and examples all through, so as to enable the learners to find practical contexts in global and contemporary careers of their future. The course also leads to attaining two other Graduate Attributes majorly, along with Ethics, *viz*. Engineer and Society, and Lifelong Learning.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester

L	T/P/D	C
3	0	3

(18OE1HS01) PROFESSIONAL ETHICS AND HUMAN VALUES

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To emphasize on the importance of ethics for engineers and computer scientists
- To provide a toolkit for ethical behaviour in personal and professional settings
- To relate the profession of engineering to sociocultural as well as ethical and moral contexts in India and globally
- To develop more socially conscious engineers who create and conceive a better society and a better world without sacrificing or ignoring public good

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Distinguish morals, values, and ethics in Indian and global contexts
CO-2: Resolve moral and ethical dilemmas through ethical inquiries and appropriate ethical theories
CO-3: Realize the professional role of engineers in society and the support available in creating safe solutions for the society focusing on public welfare
CO-4: Conduct themselves ethically in various roles that present themselves in professional and business environments

UNIT – I:
Motivation and Introduction to Human Values: Motivation to study ethics in engineering with justifying case studies, historical events, and current affairs; Morals, Values, and Ethics – Definitions; Moral Judgement vs. Value Judgement; Moral Character and Moral Autonomy – Conscientiousness, Integrity, Empathy as basic building blocks; The Golden Rule; Maslow's Theory of Needs; Universal Human Values and Theories; Conventional and Constitutional Values in Indian Ethos; Anomie vs. Civic Virtue as a foundation for an ideal society; Ethics as a basis of legal framework; Privacy and Confidentiality – Increasing emphasis in personal and professional lives, technological considerations and examples; Profession, Professionalism – Definitions, Engineering as a Profession

UNIT – II:
Ethics, Ethical Theories, and Professionalism: Ethics through Spirituality, Religion, and beyond; Indian Philosophy and Ethos, ancient to modern – Family System, Ethical Pluralism, Unity in Diversity; Ethics as application of values and as moral philosophy – Kohlberg's theory vs. Gilligan's theory of moral development leading to ethics, examples; Moral and Ethical Dilemmas – Definition, Causes, Case Studies and Examples; Resolution of Ethical Dilemmas through Ethical Inquiries – Normative, Conceptual, and Factual Inquiries, Classification of Ethics by Character and Conduct – Consequentialism/ Utilitarianism, Deontological Ethics, Virtue Ethics and Theories, Rights Theories; Ethical Frameworks and examples; Practical application of ethical theories for decision-making in personal life

UNIT – III:

Professionalism, Engineering in the Societal Context: Professionalism – Professional Traits, Rights, Responsibilities, Roles, Virtues; Business Ethics; Engineering as Social Experimentation – Context with examples, Comparison with standard experiments, Application of Ethical Inquiries to gain knowledge and to gather relevant information, Responsibility of Experimenters, Accountability and Answerability, Consensus and Need for Informed Consent – how to address exceptions; Responsible Innovation – Social Context of Innovation, Responsible Research and Innovation, Data Privacy and Protection of Individual Rights, being Ethical by Design; Trust in the context of professionalism – confidentiality, non-disclosure agreements (NDA); Intellectual Property (IP) – IP Rights (IPR) as Professional Rights, Law, Moral Rights and Economic Rights, Patenting; Diverse roles of Engineers as Professionals – Manager, Leader, Consultant, and Expert Witness

UNIT – IV:

Professional Ethics, Ethics at Workplace and Roles of Engineers: Overview of Organizational Behaviour; Collegiality, Loyalty, Trust in professional context; Respect for Authority vs. Moral Autonomy, Moral Responsibility; Organizational context of Ethics – Minor, interpersonal, severe, organizational workplace deviances; Occupational Crime, Culpable mistakes, Collateral damage; Gifts and bribes; Industrial Ethics for non-professionals; Code of ethics and Code of Conduct – Role of professional societies in guiding, promoting, and protecting professionals and professions, Examples of common professional societies in Engineering and Science; Decision-making in professional context – Choosing the right guidance, choosing the right ethical theory; Conflicts in profession and at workplace - Employee Relations and Discrimination, Conflict of Interest, Conflict Management and Resolution, Framework for Conflict Resolution; Multinational Companies and Corporates – Work Culture and Respect for Diversity and Pluralism; Employee Rights vs. Professional Rights; Whistleblowing – Social, Organizational, and Legal context with examples

UNIT – V:

Public Welfare, Safety & Risk: Impact of engineering activities and technology on Public Welfare; Ethical Concerns of Public welfare in the context of Emerging Technologies – Artificial Intelligence, Machine Learning, Internet of Things, Cybersecurity and Cybercrime; Issues of Public Concern – Informed Consent, Health and environmental aspects, data security; Safety and Risk – Definitions; Risk Assessment – Known and Unintended consequences, Risk-Benefit Analysis, Reducing Risk, Optimum Level of Safety, Capability Curves, Safe Exit; Learning from the Past – Case Studies in Ethics Context: Titanic, Bhopal, Chernobyl; Environmental Ethics and Sustainable Development Goals; Computer Ethics and various Technology Ethics; Ethics in the context of War and Weapon Development; Ethics and Economics – Fair Trade, Capitalism vs. Communism, Developed vs. Developing vs. Underdeveloped economies

UNIT – VI:

Ethics for Lifelong Learning: Ethics in the context of Globalization; Moral Character and Ethical Leadership – Case Studies and Examples of success and failure; Overview and comparison of different schools of thought, comparison of the works of pioneering philosophers and social scientists – Immanuel Kant, John Rawls, Martin Heidegger, Swami Vivekananda, JidduKrishnamurti, Dr. Abdul Kalam, *etc.*; Impact of Ethical and Unethical Behaviour in personal and professional lives, developing and maintaining

ethical behaviour, threats to moral autonomy and how to continue to be ethical in personal and professional lives

TEXT BOOKS:
1. Ethics in Engineering, Mike W. Martin, Roland Schinzinger, McGraw-Hill Education, 2017 (ISBN: 978-9339204457)
2. Business Ethics: An Indian Perspective, A. C. Fernando, K. P. Muralidheeran, E. K. Satheesh, Pearson Education, 2019 (ISBN: 978-9353437442)
3. Professional Ethics, R. Subramanian, Oxford University Press, 2017 (ISBN: 978-0199475070)

REFERENCES:
1. Engineering Ethics: Concepts & Cases, Charles E. Harris, Jr., Michael S. Pritchard, Michael J. Rabins, Cengage Learning, 2012 (ISBN: 978-8131517291)
2. Classical Indian Ethical Thought: A Philosophical Study of Hindu, Jaina and Bauddha Morals, Kedar Nath Tiwari, Motilal Banarsidass Publishers, 2017 (ISBN: 978-8120816084)
3. The Manual for Indian Start-Ups, Dalai Lama, Ethics for the Whole World 978-9351360803 Vijay Kumar Ivaturi et al., Penguin Random House India, 2017 (ISBN: 978-0143428527)
4. To Be Human, JidduKrishnamurti, Shambhala, 2000 (ISBN: 978-1570625961)
5. On Ethics and Economics, Amartya Sen, Oxford India, 1999 (ISBN: 978-0195627619)

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VI Semester

L	T/P/D	C
3	0	3

(18OE1HS02) ENTREPRENEURSHIP

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To motivate the engineers to inculcate the skills thereof in any professional role and to consider intrapreneurship or entrepreneurship as career choices for personal and societal growth
- To impart lean management principles and practices to plan, execute, and convert one's own idea into a sustainable business model
- To gain practical knowledge to design one's own lean startup
- To identify and avoid the potential pitfalls in validation, design, production, and marketing phases of an innovative product or service

COURSE OUTCOMES: After completion of the course, the student should be able to
 CO-1: Discover societal problems as entrepreneurial opportunities and ideate to develop solutions through systematic and creative approaches to innovation and business strategy
CO-2: Apply lean methodology to startup ideas using Business Model Canvas and Lean Canvas and be able to create Business Plan
CO-3: Validate ideas, design, production, and marketing systematically using techniques such as 5 Whys, Innovation Accounting, Value and Growth Propositions
CO-4: To strategize during ideation, production, market research, marketing and facing competition

UNIT – I:
Entrepreneurial Skills and Opportunities : Role of Entrepreneurs in Indian and World Economy; Entrepreneurship as a career for engineers, scientists, and technologists; Personality and Skill Set of an Entrepreneur; Need for Ethics and Empathy for Entrepreneurs; Stories of Successful and Failed Enterprises; Current Business Trends; Entrepreneurial Management vs. Corporate Management – Roles and Scope; Concepts of Intrapreneurship, Social Entrepreneurship, Technopreneurship, Studentpreneurship; Opportunities in Telangana State and India – incubators, schemes, accelerators

UNIT – II:
Introduction to Lean Startup Methodology: Overview, Principles of Lean Startup, Lean vs. Traditional Startup; Vision-to-Steering, Start-Define-Learn-Experiment, Leap-Test-Measure-Pivot, Build-Measure-Learn

UNIT – III:
Business Model Concepts: Components of Business Plan; Business Model Canvas (BMC); Lean Canvas (LC); Pitch Deck; Elevator Pitch; Financial Aspects – Financing, Funding Stages, Inflows, Outflows; Market Research and Marketing

UNIT – IV:

Building Your Business Model: Desirability, Feasibility, and Viability; Minimum Viable Product (MVP), Proof of Concept (PoC), Prototype; Early Adopters; Value Proposition; Overview of opportunities in India – Financing and Support Schemes, Online and Offline Resources, Entrepreneurial Networks

UNIT – V:

Evaluating Your Business Model: Three Learning Milestones of Innovation; Root Cause Analysis (RCA) through 5 Whys; Pivot or Persevere; The Engines of Growth: Sticky, Viral, and Paid; Kan-ban Diagram for Project Planning and Resource Allocation

UNIT – VI:

Strengthen Your Business Model: Why startups fail? Value and Waste; Design Thinking for Business; Analogs and Antilogs; Paralysis by Analysis and Extinct by Instinct; The three A's: Actionable, Accessible, and Auditable Metrics and Vanity Metrics

TEXT BOOKS:
1. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Eric Ries, Penguin Portfolio, 2015 (ISBN: 978-0670921607)
2. Entrepreneurship, Robert D. Hisrich, Michael P. Peters and Dean A. Shepherd, Tata McGraw-Hill, 11th Ed., 2020 (ISBN: 978-9390113316)
3. Entrepreneurship Simplified: From Idea to IPO, Ashok Soota, S R Gopalan, Penguin Random House India, 2016 (ISBN: 978-0670088959)
4. Startup Easy - Part 1: The Essentials, Shishir Gupta, StartupLanes.Com, 2017 (ISBN: 978-9386503886)

REFERENCES:
1. Measure What Matters: OKRs: The Simple Idea that Drives 10x Growth, John Doerr, Penguin Portfolio, 2018 (ISBN: 978-0241348482)
2. Entrepreneurship Development and Business Ethics, Abhik Kumar Mukherjee, Shaunae Roy, Oxford University Press, 2019 (ISBN: 978-0199494460)
3. The Manual for Indian Start-Ups, Vijay Kumar Ivaturi et al., Penguin Random House India, 2017 (ISBN: 978-0143428527)
4. Social Entrepreneurship in India: Quarter Idealism and a Pound of Pragmatism, Madhukar Shukla, SAGE Publications India Pvt Ltd, 2020 (ISBN: 978-9353882372)
5. Entrepreneurship: A South Asian perspective. Donald F Kuratko, T.V Rao. Cengage Learning, 2012

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B.Tech. VII Semester	L	T/P/D	C
	3	0	3

(18OE1HS03) PERSONALITY DEVELOPMENT AND PUBLIC SPEAKING

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To develop skills and techniques for Effective Communication and Public Speaking
- To develop Leadership qualities and increase Self – confidence
- To get along with people and Team-Building
- To enhance career opportunities by Goal setting
- To develop an acceptable personality

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Communicate better and speak with confidence
CO-2: Exhibit Leadership qualities and increased Self – confidence
CO-3: Work towards Team-Building
CO-4: Use career opportunities by Goal setting
CO-5: Acquire a forceful personality to maintain a pleasant relationship between the seniors and subordinates and other stakeholders

UNIT – I:
EFECTIVE COMMUNICATION
i. Fundamentals of Effective Communication
ii. How to sell your ideas
iii. Communication within Industry (awareness of motivation, ego states, games, etc.)
iv. Guidelines on: Listening, Reading and Writing
v. Non-verbal Communication (Body Language)
vi. Barriers of Communication

UNIT – II:
PUBLIC SPEAKING (SPEECH COMMUNICATION)
i. How to develop courage and self-confidence
ii. Speech purposes, preparation patterns and outlining of speech
iii. Fundamentals and secrets of good delivery
iv. How to make your meaning clear and convince an audience / client
v. How to close effectively and get action?
vi. How to participate in conferences, group discussions and office meetings

UNIT – III:
PERSONALITY DEVELOPMENT -1
i. Leadership - qualities of a successful leader ; Leadership Styles; Leadership in Administration; Problem-solving & Decision-making
ii. Group Dynamics and Team Building
iii. Importance of groups in organization; Interactions in group, Group Decision Taking, Team Building, Interaction with the Team, Building a good team

UNIT – IV:
PERSONALITY DEVELOPMENT -2
i.   Interpersonal Relations- Introduction; Transactional Analysis in communication Awareness of Ego states and their application in communication
ii.   Conflict Management- Introduction & Causes of Conflict; Managing Conflict

UNIT – V:
PERSONALITY DEVELOPMENT -3
i.   Positive Attitude &Ways to develop positive attitude
Self Esteem & Confidence Building
ii.   Motivation- Importance of self-motivation;
iii.   Stress -Causes of Stress & Impact of Stress; Managing Stress

UNIT – VI:
PERSONALITY DEVELOPMENT -4
i.   Goal Setting-Meaning; Short, medium and Long Term Goals;
Importance of Goal setting & Steps for Goal Setting
ii.   Creativity-Meaning; Barriers to Creativity & Steps to stimulate Creativity
Understanding and Importance of Human Values; Ideals in Life; Becoming a Role Model
iii.   Time Management - Time as a Resource; Techniques for better Time Management.

TEXT BOOKS:
1. Advance Speaking Skills, Jeremy Harmar& John Arnold, Essex, Longman Group Limited, 1978
2. Developing Soft Skills, Sherfield, R. M., Montgomery, R. J., Moody, P. G. 4th Edition, Pearson, 2010
3. Personality Development and Soft Skills, Barun K. Mitra, Oxford University Press, 2016

REFERENCES:
1. Body Language: A Guide for Professionals, Hedwig Lewis, Response Books (A division of Sage Publications India, Pvt. Ltd.,) New Delhi, 1998
2. Emotional Intelligence, Daniel Goldman, Bantam Books, 1995
3. Personality Development, Rajiv Mishra, Rupa & Co., 2004

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VIII Semester	L	T/P/D	C
	3	0	3

(18OE1HS04) FOREIGN LANGUAGE – FRENCH

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To communicate verbally in a simple way by asking and responding to simple questions related to everyday language needs
- To read and comprehend different kinds of texts (notices, informal letters, catalogues, menus etc.)
- To write clear, concise, and correct sentences and paragraphs on familiar topics.
- To recognize and use basic syntax and structures in French including articles, prepositions and connecting words as well as master basic vocabulary

COURSE OUTCOMES: After completion of the course, the student should be able to
 CO-1: Use vocabulary contextually and effectively
CO-2: Use reading skills to comprehend different kinds of texts
CO-3: Understand everyday expressions dealing with simple and concrete everyday needs, in clear, slow and well-articulated speech and manage very short mini dialogues /conversations
CO-4: Demonstrate basic competence in Written French including grammar, sentence and paragraph structure, coherence

UNIT – I: Introduce oneself and introduce someone:
Reading: Read and understand an introduction about someone
Grammar: Question words, Subject verb agreement, Mas/fem and prepositions with cities and countries
Vocabulary: professions, nationalities, countries numbers, days of the week and verbs
Writing: Build basic sentences and Write about oneself
Life Skills: Greetings, Formal and Informal way of asking questions

UNIT – II: Express likes and dislikes and Talk about your locality:
Reading: Read and understand description of a place
Grammar: Articles, prepositions, possessive adjectives, basic connecting words such as **"like, and, but",** and Negation
Vocabulary: Adjectives, verbs of preference, different places, and basic vocabulary on leisure and sports activities.
Writing: Write about hobbies and pastimes
Life Skills: Conversation fillers

UNIT – III: Take / Fix an appointment with someone:
Reading: Understand propositions and counters
Grammar: How to say time, Interrogative adjectives
Vocabulary: Irregular verbs, days of the week, Fixed expressions with Etre and Avoir and expressions to ask for appointment or refuse/accept a proposed time
Life Skills: Telephone etiquette and colloquial expressions in French

UNIT – IV: Talk about your routine / Invite someone and Accept or refuse an invitation
Reading: Read and understand an invitation on basic info: date and time, venue, occasion, type of invitation etc.
Grammar: Question word Why, Connecting word "because", partitive and contracted articles, reflexive verbs
Vocabulary: Expressions to propose, thank / apologize and accept or refuse an invitation,
Writing: Respond to an invitation (Accept or refuse)
Life Skills: At the table

UNIT – V: Ask for information (timings, price, etc) and Ask for/ Give Directions
Reading: Understand signboards and instructions
Grammar: Imperative mode and prepositions.
Vocabulary: Directions, Expressions to ask information or seek precision
Writing: Give instructions and fill a form

UNIT – VI: Vacation (plan vacation, choose destination, visit, and appreciate)
Reading: Read and understand travel brochures for basic info on offers, locations, touristic attractions hotels and so on
Grammar: demonstrative adjectives and near future tense
Vocabulary: Weather forecast, modes of transport, and vacation activities
Writing: Write a post card
Life Skills: Types of vacation in France

TEXT BOOKS:
1. Painless French, Carol Chitin, M.S., Lynn Gore, Barrons Educational Series, 2016 (ISBN: 978-1438007700)
2. Language Learning University, French: Learn French for Beginners Including French Grammar, French Short Stories and 1000+ French Phrases, Createspace Independent Publications, 2018 (ISBN: 978-1726415002)
3. Language School, French Language for Beginners, 2019 (ISBN: 978-1700175700)

REFERENCES:
1. Practice Makes Perfect: Complete French All-in-One, Annie Heminway, McGraw-Hill Education, 2018 (ISBN: 978-1260121032)
2. Easy French Step-by-Step, Myrna Bell Rochester, McGraw-Hill Education, 2008 (ISBN: 978-0071453875)
3. Contacts: Langue et culture françaises, Jean-Paul Valette, Rebecca Valette, Wadsworth Publishing Co. Inc., 2012 (ISBN: 978-1133309581)

B.Tech.	L	T/P/D	C
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(18OE1CE09) SMART CITIES

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand smart city basic concepts, global standards, and Indian context of smart cities
- To explain smart community, smart transportation and smart buildings
- To understand Energy demand, Green approach to meet Energy demand and their capacities
- To identify Smart Transportation Technologies in cities and concepts towards smart city

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain and elaborate smart city concepts and their international and national standards
CO-2: Conceptualize smart community, transportation and building concepts
CO-3: Develop and calibrate energy demand and their capacity limits
CO-4: Predict the various smart urban transportation systems and the transition from existing city towards a smart city

UNIT – I:
Introduction to Smart Cities: Introduction to Smart Cities - Understanding Smart Cities - Dimensions of Smart Cities – World urbanization, Global Experience of Smart Cities, Smart City case studies-Indian scenario - India "100 Smart Cities" Policy and Mission.

UNIT – II:
City as a System of Systems: Systems thinking – Developing a smart city approach – Core elements of a smart city – Relevant open data for a smart city – Sustainability – Privacy and Ethics – Energy systems for smarter cities.

UNIT – III
Smart Cities Planning and Development: Introduction to Smart Community; Smart community concepts: Concept of Smart Community - Smart Transportation - Smart Building and Home Device - Smart Health - Smart Government - Smart Energy and Water - Cybersecurity, Safety, and Privacy; Internet of Things, Blockchain, Artificial Intelligence, Alternate Reality, Virtual Reality.

UNIT – IV:
Smart Urban Energy Systems: Conventional vs. Smart, City components, Energy demand, Green approach to meet Energy demand, Index of Indian cities towards smartness – a statistical analysis -Meeting energy demand through direct and indirect solar resources- Efficiency of indirect solar resources and its utility, Capacity limit for the indirect solar resources- Effectiveness in responsive environment in smart city; Smart communication using green resources- **Relevant case studies**

UNIT – V:

Smart Transportation Systems: Smart Transportation Technologies - Driverless and connected vehicles - ride sharing solutions - The "improve" pathway - The "shift" pathway – Smart Roads and Pavement systems – Relevant case studies

UNIT – VI:

Future of Smart Cities: The transition of legacy cities to Smart - Right transition process - the benefit of citizens, cities have to adopt effective management and governance approaches-factors in the transition phase of legacy cities to Smart cities and their managerial implications.

TEXT BOOKS:

1. Internet of Things in Smart Technologies for Sustainable Urban Development, G. R. Kanagachidambaresan, R. Maheswar, V. Manikandan, K. Ramakrishnan., Springer, 2020
2. Society 5.0: A People-Centric Super-Smart Society, Hitachi-UTokyo Laboratory (H-UTokyo Lab), Springer, 2020
3. The Routledge Companion to Smart Cities, Katharine S. Willis, Alessandro Aurigi, Routledge International Handbooks, 2020

REFERENCES:

1. Smart Cities in Asia: Governing Development in the Era of Hyper-Connectivity Yu-min Joo, Yu-Min Joo, Teck-Boon Tan, Edward Elgar Pub, 2020
2. Urban Systems Design: Creating Sustainable Smart Cities in the Internet of Things Era, Yoshiki Yamagata, Perry P. J. Yang, Elsevier, 2020
3. Smart Cities and Artificial Intelligence: Convergent Systems for Planning, Design, and Operations, Christopher Grant Kirwan, Zhiyong Fu, Elsevier, 2020

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B.Tech.

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(18OE1EE05) TRENDS IN ENERGY SOURCES FOR SUSTAINABLE DEVLOPMENT

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the role of sustainable energy
- To know components of solar PV and wind energy conversion systems
- To understand the principles of Biomass, geo-thermal and wave energy systems
- To learn various energy storage methods

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand various sources for sustainable energy
CO-2: Understand Solar Photo voltaic and wind energy systems
CO-3: Learnt the harnessing techniques of Biomass, geothermal and ocean energy
CO-4: Familiarize with energy storage methods

UNIT – I:
Introduction: Trends in energy consumption - Conventional and renewable sources, Energy sources and their availability, Energy Conservation status in India -need of new energies for sustainable development.

UNIT – II:
Fundamentals of Solar Radiation: Introduction-The Sun as Source of Energy, Extraterrestrial and Terrestrial Radiations, Spectral Power Distribution of Solar Radiation, instruments for measuring solar radiation and sunshine recorder.
Solar PV Conversion: The PV Cell-Crystalline Solar cells -Thin film and amorphous solar cells, Module, Array, Equivalent Electrical circuit- Open circuit voltage and Short circuit current, I-V, P-V Curves. Developments in efficient non silicon solar cells

UNIT – III:
Wind Energy: origin of winds-Global (or Planetary) Winds- Local Winds-Factors Affecting the Distribution of Wind Energy on the Surface of Earth, Wind Turbine – Types, construction of HAWT, VAWT, performance characteristics, Betz criteria.

UNIT – IV:
Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Biogas digesters, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

UNIT – V:
Geothermal Energy: Resources, types of wells, methods of harnessing the energy
Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.
Tidal and Wave Energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT – VI:
Energy Storage:

Electro Chemical Storage: lead-acid- nickel cadmium-nickel-metal-hydride and lithium type batteries-Principle of operation, Types, Advantages and disadvantages.
Non-Electric Storage: Methods of Energy storage –Pumped Energy Storage – Compressed air Energy Storage, Superconducting Magnet Energy Storage.

TEXT BOOKS:
1. Non-Conventional Energy Sources, G. D. Rai, 6th Edition, Khanna Publishers, 2004
2. Non-Convention Energy Resources, B.H. Khan, 3rd Edition, McGraw-Hill, 2017

REFERENCES:
1. Renewable Energy Sources, Twidell& Weir, 3rd Edition, CRC Press, 2015
2. Solar Energy, Sukhatme, 3rd Edition, McGraw-Hill, 2008
3. Non-Conventional Energy, Ashok V. Desai, Wiley Eastern, 1990

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B.Tech.	L	T/P/D	C
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(18OE1ME05) 3D PRINTING AND DESIGN

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the need and know about the applications of 3D Printing
- To understand the need of liquid and solid based 3D Printing systems
- To know about the laser-based 3D Printing systems and importance of CAD for 3D Printing
- To understand post-processing, inspection and testing involved in 3D Printing

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Summarize the importance of 3D Printing
CO-2: Explain the process involved in liquid and solid based 3D Printing Systems
CO-3: Explain about the laser-based 3D Printing systems and CAD for 3D Printing
CO-4: Plan post-processing techniques and perform inspection and testing in 3D Printing

UNIT – I:
Introduction: Introduction to 3D Printing, Classification, 3D Printing Process Chain, Materials for 3D Printing, Distinction between 3D Printing & Conventional Manufacturing.
Applications: Brief overview of applications in Aerospace, Automotive, Biomedical, Defense, Construction, Jewelry, Coin and Tableware Industry.

UNIT – II:
Liquid Based 3D Printing Systems: Introduction, Principle, Processes and Applications of Material Jetting and Binder Jetting.

UNIT – III:
Solid Based 3D Printing Systems: Introduction, Principle, Processes and Applications of Fused Deposition Modeling (FDM) and Laminated Object Manufacturing (LOM).

UNIT – IV:
Laser Based 3D Printing Systems: Introduction, Principle, Processes and Applications of Selective Laser Sintering (SLS), Three-Dimensional Printing (3DP).

UNIT – V:
CAD for 3D Printing: CAD data formats, CAD model preparation, Part orientation and support generation, Overview of 3D Printing softwares like MAGICS and MIMICS only.

UNIT – VI:
Post Processing: Introduction, Post Processing Techniques like Support material removal, Cleaning, Sanding and Polishing.
Inspection: Introduction, Significance, Inspection techniques like Dimensional measurement along X, Y and Z axes, visual inspection of the surface finish (overall

aesthetics and intact features), flatness or warp check, and FOD (foreign objects or debris) check.

TEXT BOOKS:

1. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Ian Gibson, David W. Rosen, Brent Stucker., Springer, 2010
2. Rapid Prototyping: Principles and Applications, Chua C. K., Leong K. F., and Lim C. S., 3rd Edition, World Scientific, 2010

REFERENCES:

1. Rapid Prototyping and Engineering Applications: A Toolbox for Prototype Development, Liou L. W. and Liou F. W., CRC Press, 2007
2. Rapid Prototyping: Theory and Practice, Kamrani A. K. and Nasr E. A., Springer, 2006
3. Rapid Tooling: Technologies and Industrial Applications, Hilton P. D. and Jacobs P. F., CRC Press, 2000
4. Rapid Prototyping, Gebhardt A., Hanser Gardener Publications, 2003

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(18OE1EC09) EMBEDDED SYSTEMS FOR IOT

COURSE PRE-REQUISITES: Programming through C

COURSE OBJECTIVES:
- To understand the basics of computing with Embedded Systems
- To expose the students to various smart sensors
- To make the students familiar with the programming concepts of Embedded development board
- To understand the basics of Internet of Things and Cloud of things

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Familiar with architectural and programming issues of Embedded Systems
CO-2: Able to select proper smart Sensor for a specific measurement application
CO-3: Analyze various protocols for Internet of Things
CO-4: Apply Internet of Things to different applications in the real world

UNIT – I:
Embedded System Design: Numbering and Coding Systems, Digital Premier, Inside the Computer
Embedded System - Definition, Characteristics of embedded computing applications, Design challenges, Requirements, Specification, Architecture design, Designing hardware and software components, system integration.

UNIT – II:
Smart Sensors & Applications: Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication, Standards for Smart Sensor Interface, the Automation.

UNIT – III:
Sensors Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing, Sensors for environmental Monitoring.

UNIT – IV:
Micro Controller Board: Features of Arduino, Arduino components and IDE, **Interfacing:** Seven Segment Display, Pulse Width Modulation, Analog Digital Converter, Wireless connectivity to Arduino. Case study: From BT To WiFi: Creating WiFi Controlled Arduino Robot Car.

UNIT – V:
Introduction to Internet of Things: Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Deployment Templates, M2M, IoT vs M2M.

UNIT – VI:

Domain Specific Applications of IoT: IoT Design Methodology, Applications of IoT– Home, Health, Environment, Energy, Agriculture, Industry and Smart City.

TEXT BOOKS:

1. The 8051 Microcontroller: Programming, Architecture, Ayala &Gadre, 3rd Edition, Cengage Publications, 2008
2. Sensors and Transducers, D. Patranabis, 2nd Edition, PHI Learning Private Limited, 2013
3. Internet of Things: A Hands-On Approach, Vijay Madisetti, ArshdeepBahga, Universities Press, 2015

REFERENCES:

1. Embedded Systems: Architecture, Programming and Design, 2nd Edition, TMH
2. The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, 2nd Edition, 2005
3. Internet of Things with Raspberry Pi and Arduino, Singh R., Gehlot A., Gupta L., Singh B., Swain M., Boca Raton, CRC Press, 2020

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(18OE1CS09) ARTIFICIAL INTELLIGENCE – A BEGINNER'S GUIDE

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand and analyze the basic concepts of artificial intelligence
- To identify, explore the complex problem-solving strategies and approaches
- To analyze the concepts of basic concepts of neural networks and learning process
- To explore and analyze the methodology used in machine learning and computer vision

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand and apply the basic concepts of artificial intelligence and its use cases. lives
CO-2: Explore the various search strategies and approaches for problem solving
CO-3: Correlate the fields related to AI, and articulate various learning paradigms
CO-4: Describe several issues and ethical concerns surrounding AI

UNIT – I:
Introduction to AI: What is AI-On Overview, History of AI, Applications and Examples of AI, AI Concepts, Terminology, Key fields of AI. AI Issues, Concerns, and Ethical Considerations.

UNIT – II:
AI as Search Process: On overview of Search Strategy. Types of Searches- Uninformed, Informed, Bidirectional search, Heuristic search. Local search, Local beam search, Adversarial Search.

UNIT – III:
AI as Knowledge Exploration: Introduction to Propositional Logic, Rules of Inference, First Order Logic (FOL) Syntax, Semantics, Entailment, Tools to represent knowledge.

UNIT – IV:
AI as a Learning Task: Introduction to Learning, Learning types -Supervised, Unsupervised, Reinforcement Learning, Machine learning, Deep Learning, The link between AI, ML, DL.

UNIT – V:
AI as Neural Networks: Introduction to biological neural networks. Link between biological neuron and artificial neuron. Architecture of artificial neural network, Types of Neural networks-single layer, multilayer, Back propagation networks.

UNIT – VI:
The Future of AI: Computer Vision - Seeing the World Through AI, Bots - Conversation as a Platform, AI and the society, AI in action-the Use Cases, Building AI Projects.

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Prentice Hall, 2010
2. Machine Learning, Tom M. Mitchell, McGraw-Hill Publications
3. Neural Networks-A Comprehensive Foundation, Simon Haykin, 2nd Edition, Pearson Education, 2004

REFERENCES:

1. Artificial Intelligence, Elaine Rich & Kevin Knight, 2nd Edition, TMH
2. Artificial Intelligence, A New Synthesis, Nils J. Nilsson, Elsevier
3. Artificial Neural Networks, Yegna Narayana B., PHI

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(18OE1CS10) BLOCKCHAIN TECHNOLOGY ESSENTIALS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To introduce and get the technological overview of blockchain technologies
- To Study the foundation of Blockchain Technology and demonstrate the various types of Blockchain
- To explore the application area of Blockchain Technology
- To introduce smart contract, consensus algorithm and Security Mechanism
- Introduction to available platforms to implement Blockchain Technology

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand and explore the Blockchain Technology
CO-2: Describe smart contract concepts
CO-3: Explore different types of Blockchain
CO-4: Develop the platforms to implement Blockchain Technology

UNIT – I:
Fundamental of Blockchain Part I: Introduction to Centralized, Decentralized and Distributed system, computer network peer to peer connection
Fundamental of Blockchain Part II: History of Blockchain, Various technical definitions of Blockchain. Generic elements of a blockchain: Block, Transaction, Node, Why It's Called "Blockchain", Characteristics of Blockchain Technology, Advantages of blockchain technology, Limitations of blockchain as a technology

UNIT – II:
Concept of Blockchain Technology Part I: Applications of blockchain technology, Tiers of blockchain technology Blockchain 0, Blockchain 1, Blockchain 2, Blockchain 3, Generation of Blockchain X, smart contract
Concept of Blockchain Technology Part II: Types of blockchain: Public blockchain, private blockchain, hybrid blockchain, examples of Public, private, hybrid blockchain and it merit and demerit.

UNIT – III:
Technical Foundations Part I: Component of block, Structure of Block chain, Technical Characteristics of the Blockchain, genesis block, Nonce
Technical Foundations Part II: Cryptography, Hashing, Distributed database, Consensus mechanisms, and basic of Cryptographic primitives, Technical Characteristics of Secure Hash Algorithms (SHA), Digital signature.

UNIT – IV:
Consensus Algorithm: Proof of work (PoW), Proof-of-Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of authority (PoA), Confidentiality, Integrity, Authentication, Permissioned ledger, Distributed ledger, Shared ledger, Fully private and proprietary

blockchains, Tokenized blockchains, Tokenless blockchains, CAP theorem and blockchain

UNIT – V:
E-Governance and other contract enforcement mechanisms, Financial markets and trading, Trading, Exchanges, Trade life cycle, Order anticipators, Market manipulation.
Crypto Currency: Bitcoin, Bitcoin definition, Keys and addresses, Public keys in Bitcoin, Private keys in Bitcoin, Bitcoin currency units

UNIT – VI:
Implementation Platforms: Hyperledger as a protocol, Reference architecture, Hyperledger Fabric, Transaction Flow, Hyperledger Fabric Details, Fabric Membership, Fabric Membership

TEXT BOOKS:
1. Mastering Blockchain, Imaran Bashir, 2nd Edition, Packt
2. Blockchain Basic, Daniel Drescher, A Press

REFERENCES:
1. Blockchain For Dummies®, IBM Limited Edition, John Wiley & Sons, Inc.

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(18OE1EI05) FUNDAMENTALS OF ROBOTICS AND DRONES

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To classify by coordinate system and control system
- To acquire Knowledge on different types Power Sources and Sensors
- To classify different types of Manipulators, Actuators and Grippers
- To acquire Knowledge on kinematics and Vision systems used for different Robots
- To acquire Knowledge on the basics of Drones

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Acquire knowledge on different types of Power Sources (actuators) and Sensors, Manipulators, Actuators and Grippers
CO-2: Acquire knowledge on different applications of various types of robots
CO-3: Analyze the direct and the inverse kinematic problems and calculate the manipulator dynamics
CO-4: Acquire knowledge on the applications of Machine Vision in Robotics
CO-5: Acquire Knowledge on the basics of Drones

UNIT – I:
Basic Concepts & Fundamentals: An overview of Robotics, classification of Robots, Robot Components, Robot degrees of freedom, Robot Joints, Robot Coordinates, Robot reference frames, Programming modes, Robot Characteristics.

UNIT – II:
Sensors and Actuators:
Sensors: Sensors characteristics, Position sensors, velocity sensors, acceleration sensors, torque sensors, micro switches, lighten infrared sensors, touch and tactile sensors, proximity sensors, range finders.
Actuators: Characteristics of activating system, comparison of activating system Hydraulic devices, Pneumatic devices, electric motors, magneto-strictive actuators.

UNIT – III:
Manipulators and Grippers:
Grippers: Robot end effectors, Classification, drive system for Gripper, Mechanical Grippers, Magnetic Grippers, Vacuum Grippers, Adhesive Grippers, Hooks, Scoops and other Miscellaneous Devices, Gripper force Analysis and Gripper Design, Active and passive Grippers.

UNIT – IV:
Kinematics: Matrix representation of translational and Rotational motion – Homogeneous Transformation-DH representation of standard configuration Robots-Inverse Kinematics. Joint space vs. Cartesian space-Basics of Trajectory planning in joint and Cartesian space.

UNIT – V:
Robot Vision: Low level and High-level vision

Image acquisition, Illumination Techniques, Imaging Geometry, Some Basic Relationships between Pixels, Segmentation, Description, Segmentation and Description of 3-D Structures, Recognition, Interpretation.

UNIT – VI:
Basics of Drones: Theory behind how drones work, individual components that makeup a drone, basic concepts involved radio-controlled model flying, building a complete quad copter drone from scratch

TEXT BOOKS:
1. Introduction To Robotics: Analysis, Control, Applications, Wiley, Saeed B. Niku, 2nd Edition
2. Industrial Robotics, Technology Programming and Applications, Mikell P. Groover, Nicholas G. Odrey, Mitchel Weiss, Roger N. Nagel, Ashish Dutta, McGraw-Hill, 2012

REFERENCES:
1. Robotics Technology and Flexible Automation, Deb S. R., John Wiley
2. Robots and Manufacturing Automation, Asfahl C. R., John Wiley
3. Robotic Engineering–An Integrated Approach, Klafter R. D., Chimielewski T. A., Negin. M, Prentice Hall of India, New Delhi
4. Drones for Beginners, Udemy

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(18OE1IT08) FUNDAMENTALS OF CYBER SECURITY

COURSE PRE-REQUISITES: Basic Knowledge of Computers, Basic Knowledge of Networking and Internet

COURSE OBJECTIVES:
- To identify the key components of cyber security in network
- To describe the techniques in protecting Information security
- To define types of analyzing and monitoring potential threats and attacks
- To access additional external resources to supplement knowledge of cyber forensics and laws

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand, appreciate, employ, design and implement appropriate security technologies
CO-2: Demonstrate policies to protect computers and digital information
CO-3: Identify& Evaluate Information Security threats and vulnerabilities in Information Systems
CO-4: Understanding computer forensics and analyzing them

UNIT – I:
Introduction to Cybersecurity, Cybersecurity objectives, Cybersecurity roles, Differences between Information Security & Cybersecurity, Cybersecurity Principles - Confidentiality, integrity, & availability, Authentication & nonrepudiation, The Trinity of IT Security (CIA), Computer Protocols, Cookies, The TCP/IP

UNIT – II:
Who are the cyber criminals, Classification of cybercrimes, E-mail Spoofing, Spamming, Cyber defamation, Internet Time Theft, Salami Attack/ Salami Technique, Data Diddling, Forgery, Web Jacking, Newsgroup Spam/ Crimes Emanating from Usenet Newsgroup, Industrial Spying/Industrial Espionage, Hacking, Online Frauds, Pornographic Offenses, Software Piracy, Computer Sabotage, E-mail Bombing/Mail Bombs, UseNet Newsgroup as the Source of Cybercrimes, Computer Network Intrusions, Password Sniffing, Credit Card Frauds, Identity Theft.

UNIT – III:
Cyber Offenses: How Criminals Plan Them: Introduction, Categories of Cybercrime, How Criminals Plan the Attacks, Reconnaissance, Passive Attacks, Active Attacks, Scamming and Scrutinizing Gathered Information, Attack (Gaining and Maintaining the System Access), Social Engineering, Classification of Social Engineering, Cyber stalking, Types of Stalkers, Cases Reported on Cyber stalking, How Stalking Works?, Real-Life Incident of Cyber stalking, Cyber cafe and Cybercrimes,

UNIT – IV:
Security Threats: Introduction to security threats-Virus, Worms, Trojan horse, Bombs, Trap Door, E-Mail Virus, Virus Life cycle, How virus works?, Malware, Network and

Services attack- Dos attacks, Types of Dos attacks, Methods of attacks, Examples of attacks-SYN flooding, TCP flooding ,UDP flooding ,ICMP flooding ,Smurf, Ping of death, Tear drop, Security threats to E-commerce-Electronic payment system, Credit card/Debit cards, Smart cards, E- money, Electronic Fund Transfer, E-commerce security System, Electronic Cash, Digital Signatures

UNIT – V:

Introduction to Computer Forensics: computer crimes, evidence, extraction, preservation, etc. Overview of hardware and operating systems: structure of storage media/devices; windows/Macintosh/ Linux -- registry, boot process, file systems, file metadata. Data recovery: identifying hidden data, Encryption/Decryption, Steganography, recovering deleted files. Digital evidence controls: uncovering attacks that evade detection by Event Viewer, Task Manager, and other Windows GUI tools, data acquisition, disk imaging, recovering swap files, temporary &cache files, Computer Forensic tools, Network Forensic. Computer crime and Legal issues: Intellectual property, privacy issues, Criminal Justice system for forensic, audit/investigative situations and digital crime scene, investigative procedure/standards for extraction, preservation, and deposition of legal evidence in a court of law.

UNIT – VI:

Fundamentals of Cyber law: Evolution of the IT Act, Genesis and Necessity , Salient features of the IT Act, 2000, various authorities under IT Act and their powers, Penalties & Offences, amendments, Impact on other related Acts Cyber Space Jurisdiction - Jurisdiction issues under IT Act, 2000- Traditional principals of Jurisdiction - Extra-terrestrial Jurisdiction- Case Laws on Cyber Space Jurisdiction Sensitive Personal Data or Information (SPDI) in Cyber Law (a) SPDI Definition and Reasonable Security Practices in India (b) Reasonable Security Practices – International perspective

TEXT BOOKS:

1. Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and SunitBelpure, Wiley
2. Fundamentals of Cyber Security, Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, BPB Publications
3. Cyber Law & Cyber Crimes, Advocat Prashant Mali, Snow White Publications, Mumbai

REFERENCES:

1. Computer Forensics and Cyber Crime: An Introduction, Marjie T. Britz, 3rd Edition, 2013
2. Digital Forensics with Open-Source Tools. Cory Altheide and Harlan Carvey, Elsevier, 2011(ISBN: 978-1-59749- 586-8)
3. Network Forensics: Tracking Hackers Through Cyberspace, Sherri Davidoff, Jonathan Ham Prentice Hall, 2012
4. Cyber Law in India, Farooq Ahmad, Pioneer Books
5. Information Technology Law and Practice, Vakul Sharma, Universal Law Publishing Co. Pvt. Ltd.

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(18OE1IT09) FUNDAMENTALS OF DATA SCIENCE

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration
- To explore data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication
- To understand the basic knowledge of algorithms and reasonable programming experience and some familiarity with basic linear algebra and basic probability and statistics
- To identify the importance of recommendation systems and data visualization techniques

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand basic terms what Statistical Inference means. Identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data
CO-2: Discuss the significance of exploratory data analysis (EDA) in data science and to apply basic tools (plots, graphs, summary statistics) to carry out EDA
CO-3: Apply basic machine learning algorithms and to identify common approaches used for Feature Generation
CO-4: Analyze fundamental mathematical and algorithmic ingredients that constitute a Recommendation Engine and to Build their own recommendation system using existing components

UNIT – I:
Introduction: What is Data Science? - Big Data and Data Science hype – and getting past the hype - Why now? – Datafication - Current landscape of perspectives - Skill sets needed - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model - Intro to R

UNIT – II:
Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA - The Data Science Process - Case Study: Real Direct (online real estate firm) - Three Basic Machine Learning Algorithms- Linear Regression - k-Nearest Neighbors (k-NN) - k-means

UNIT – III:
One More Machine Learning Algorithm and Usage in Applications - Motivating application: Filtering Spam - Why Linear Regression and k-NN are poor choices for Filtering Spam - Naive Bayes and why it works for Filtering Spam

UNIT – IV:
Data Wrangling: APIs and other tools for scrapping the Web - Feature Generation and

Feature Selection (Extracting Meaning From Data) - Motivating application: user (customer) retention - Feature Generation (brainstorming, role of domain expertise, and place for imagination) - Feature Selection algorithms – Filters; Wrappers; Decision Trees; Random Forests

UNIT – V:
Recommendation Systems: Building a User-Facing Data Product - Algorithmic ingredients of a Recommendation Engine - Dimensionality Reduction - Singular Value Decomposition - Principal Component Analysis - Exercise: build your own recommendation system - Mining Social-Network Graphs - Social networks as graphs - Clustering of graphs - Direct discovery of communities in graphs - Partitioning of graphs - Neighbourhood properties in graphs

UNIT – VI:
Data Visualization: Basic principles, ideas and tools for data visualization 3 - Examples of inspiring (industry) projects - Exercise: create your own visualization of a complex dataset - Data Science and Ethical Issues - Discussions on privacy, security, ethics - A look back at Data Science - Next-generation data scientists

TEXT BOOKS:
1. Doing Data Science, Straight Talk From The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014
2. Mining of Massive Datasets v2.1, Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, Cambridge University Press, 2014
3. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, 2013 (ISBN 0262018020)

REFERENCES:
1. Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, 2nd Edition, 2009 (ISBN 0387952845)
2. Foundations of Data Science, Avrim Blum, John Hopcroft and Ravindran Kannan
3. Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr. Cambridge University Press, 2014
4. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber and Jian Pei, 3rd Edition, 2011 (ISBN 0123814790)

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(18OE1AE05) INTRODUCTION TO ADVANCED VEHICLE TECHNOLOGIES

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
* To understand the layout of an automobile and functionalities chassis elements
* To provide the concepts of automotive electrical systems and electric & hybrid vehicles
* To present various intelligent automotive systems and levels of vehicle autonomy

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain the functionalities of automotive systems and subsystems
CO-2: Discuss the concepts of automotive electrical systems and electric & hybrid vehicles
CO-3: Describe various intelligent automotive systems and levels of vehicle autonomy

UNIT – I:
Introduction: Classification of automobiles, layout of an automobile and types of bodies.
Automotive Chassis: Introduction to chassis systems - engine, cooling, lubrication, fuel feed, ignition, electrical, driveline - clutch, transmission, propeller shaft, differential, axles, wheels and tyres, steering, suspension and braking.

UNIT – II:
Engine: Working principle of four stoke and two stroke SI and CI engines, fuel system – layout of petrol and diesel fuel systems, electronic fuel injection - multi-point fuel injection, gasoline direct injection, common rail direct injection.

UNIT – III:
Electrical System: Simple automotive wiring diagram and components of electrical system, starting system – starter circuit, standard Bendix and over running clutch drive, charging system – alternator, cut-outs and regulators, ignition system - conventional and electronic ignition system.

UNIT – IV:
Electric and Hybrid Vehicles: Electric vehicle – Layout, components, configurations, advantages and limitations. Hybrid vehicle - Concepts of hybrid electric drivetrain based on hybridization and powertrain configuration, architecture of series, parallel and series-parallel hybrid electric drivetrains, modes of operation, merits and demerits.

UNIT – V:
Intelligent Vehicle Systems: Automotive navigation, night vision, head-up display, airbag, seat belt tightening system, immobilizers, adaptive cruise control, forward collision warning, lane departure warning and anti-lock braking system.

UNIT – VI:

Autonomous Vehicles: Levels of automation, research, challenges, commercial development, sensor systems, sensor suits, environmental challenges, graceful degradation, V2V and V2I communication, sharing the drive, integrity, security, verification and policy implications.

TEXT BOOKS:
1. Advanced Vehicle Technology, Heinz Heisler, Butterworth Heinemann, 2002
2. Intelligent Vehicle Technologies: Theory and Applications, LjuboVlacic, Michel Parent and Fumio Harashima, Butterworth-Heinemann, Oxford, 2001
3. Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay and Ali Emadi, CRS Press, 2004

REFERENCES:
1. Automotive Mechanics, Giri N. K., Khanna Publications, 2006
2. Automotive Electrical Equipment, Kohli P. L., Tata McGraw-Hill Co. Ltd., New Delhi, 1975
3. Electric and Hybrid Vehicles – Design Fundamentals, Iqbal Husain, CRC Press, 2010
4. Autonomous Vehicle Technology-A Guide for Policymakers, James M. Anderson, Nidhi Kalra, Karlyn D. Stanley, Paul Sorensen, Constantine Samaras, Oluwatobi A. Oluwatola, RAND Corporation, Santa Monica, Calif., 2016

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	2	1	3

(18PC1IT08) DATA ANALYTICS

COURSE OBJECTIVES:
- To explore basics of R
- To understand linear and logistic regression
- To explore decision tree and text mining

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Exploring R to load, explore data and to use in data analytics
CO-2: Analyzing linear and logistic regression techniques
CO-3: Exploring decision tree, clustering and text mining algorithms
CO-4: Analyze Time Series models

UNIT – I:
Introduction to R: Introduction, Downloading and Installing R, IDEs and Text Editors, Handling Packages in R.Getting Started with R: introduction, working with Directory, Data Types   in R, Few Commands for Data Exploration,

UNIT – II:
Loading and Handling Data in R: Introduction, Challenges of Analytical Data Processing, Expression, Variables and Functions, Missing Values Treatment in R, Vectors, Matrices, Factors, List, Few common Analytical Tasks, Aggregating and Group Processing of a Variable, Simple Analysis Using R, Methods for Reading Data, Comparison of R GUIs for Data Input, Using R with Databases and Business Intelligence Systems.
Exploring Data in R: Introduction, Data Frames, R Functions for Understanding Data in Data Frames, Load Data Frames, Exploring Data, Data Summary, Finding the Missing Values, Invalid Values and Outliers, Descriptive Statistics, Spotting Problems in Data with Visualisation

UNIT – III:
Linear Regression using R: Introduction, Model Fitting, Linear Regression, Assumptions of Linear Regression, Validating Linear Assumption.
Logistic Regression: Introduction What is Regression, Introduction to Generalised Linear Models, Logistic Regression, Binary Logistic Regression, Diagnosing Logistic Regression, Multinomial Logistic Regression Models.

UNIT – IV:
Decision Tree: Introduction, What is a Decision Tree, Decision Tree Representation in R, Appropriate Problems for Decision Tree Learning, Basic Decision Tree Learning Algorithm, Measuring Features, Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Why Prefer Short Hypotheses, Issues in Decision Tree Learning.

Association Rules: Introduction, Frequent Itemset, Data Structure Overview, Mining Algorithm Interfaces, Auxiliary Functions, Sampling from Transaction, Generating Synthetic Transaction Data.

UNIT – V:
Time Series in R: Introduction, what is Time Series Data, Reading Time Series Data, Plotting Time series Data, Decomposing Time Series Data, Forecasts Using Exponential Smoothing, ARIMA Models, Case Study: Insurance Fraud Detection.
Clustering: introduction, what is clustering, basic concepts in clustering, Hierarchical Clustering, k-means Algorithm, CURE Algorithm, Clustering in Non-Euclidean Space, Clustering for Streams and Parallelism.

UNIT – VI:
Text Mining: Introduction, Definition of Text Mining, A Few Challenges in Text Mining, Text Mining vs. Data Mining, Text Mining in R, General Architecture of Text Mining Systems, Pre-processing of Documents in R, Core Text Mining Operations, Using Background Knowledge for Text Mining, Text Mining Query Languages, Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods, Frequent Itemsets, Closed Itemsets and Association Rules, Frequent Itemsets: Mining Methods, Pattern Evaluation Methods, Sentiment Analysis.

TEXT BOOKS:
1. Data Analytics using R, Seema Acharya, McGraw Hill Education, 2019
2. R for Data Science, Hadley Wickham, Garrett Grolemund, Import, Tidy, Transform, Visualize, and Model Data, 2016

REFERENCES:
1. Data Analytics with R, Bharti Motwani, 2019
2. Data Science-Theory, Analysis and Applications, Qurban A. Memon, Shakeel Ahmed Khoja, 2019

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(18HS1MG02) PRINCIPLES OF MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR

COURSE PRE-REQUISITES: Engineering Economics and Accounting (EEA)

COURSE OBJECTIVES:
- Understand the principles, functions and theories of management and expose with a systematic and critical understanding of organizational theory, structures and design
- Comprehend the conceptual knowledge relating to Organizational Behaviour.
- Provide a basic understanding of the behavior of individuals and groups in the organizations
- Develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply theories to improve the practice of management and describe and assess the basic design elements of organizational structure and evaluate their impact on employees
CO-2: Analyse the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behaviour
CO-3: Appreciate the management challenges associated with high levels of change in the organizations
CO-4: Evaluate the appropriateness of various leadership styles, conflict management strategies and motivational strategies used in a variety of organizational settings

UNIT – I:
Introduction to Management:
Concepts of Management - Nature, Importance, and Functions of management; Taylor's Scientific Management Theory; Fayol's Principles of Management; Social Responsibilities of Management; Planning-definition and types of plans; decision making-definition and process
Organizing – Definition and Principles of Organization; Organization chart; Types of mechanistic and organic structures of organization - Line Organization, Line And Staff Organization, Functional Organization, Committee Organization, Matrix Organization, Virtual Organization, Cellular Organization, Team Structure, Boundaryless Organization, Inverted Pyramid Structure, And Lean And Flat Organization Structure; features and suitability.

UNIT – II:
Motivation and Leadership:
Motivation- Definition; Theories: Maslow's need of Hierarchy, Herzberg two Factor, Mc Gregor Theory X and theory Y and Alderfer's ERG.
Leadership- Definition; Styles and Theories: Trait, Behavioural and Contingency.

UNIT – III:
Introduction to Organizational Behaviour:
Organizational Behaviour- Definition; Historical Background; Nature, Scope and Importance; Linkages with other social Sciences; Approaches and Models.

UNIT – IV:
Perception and Personality:
Perception- Definition; Factors influencing; Perceptual Selectivity; Perceptual Organisation and Social Perception.
Personality- Definition; Determinants; Theories; Traits; Big Five Personality Model.

UNIT – V:
Interpersonal Skills:
Communication- Definition; Process; Direction; Interpersonal and Organizational and Barriers.
Teams and Groups- Definition; Types of teams and groups; Five-Stage Model; Characteristics of an effective teams; Johari Window & Transactional Analysis

UNIT – VI:
Organizational – Conflict, Stress Management, Change and Development:
Organizational Conflict- Definition; Reasons; Types and Levels; Handling Styles.
Stress Management-Definition; Types; Model; Consequences and Strategies to manage
Organizational Change - Definition; Types; Resistance; Overcoming and Approaches: Lewin's Three-Step Change Model, Kotter's Eight-Step Plan for Implementing Change.
Organizational Development- Definition; Nature and Interventions.

TEXT BOOKS:
1. Management, James Arthur, Finch Stoner, R. Edward Freeman, and Daniel R. Gilbert, 6th Edition, Pearson Education/Prentice Hall
2. Organizational Behaviour, Stephen P. Robbins, Prentice Hall, 2013
3. Organizational Behaviour, Fred Luthans, McGraw-Hill, 2013

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(18PE1CS04) SOFTWARE PROJECT MANAGEMENT

COURSE OBJECTIVES:
- To identify and discuss the conventional and contemporary software project management principles
- To assess and plan project schedule and assign resources
- To apply an appropriate project development methodology among various alternating processes
- To identify project risks, understand the responsibilities, monitor and track project deadlines and the capability to work in a team environment

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Adapt the knowledge of managing, economics for conventional Vs modern software projects and Sketch various artifacts sets for better understanding of software development

CO-2: Utilize knowledge of process Workflows and Checkpoints to track the project progress

CO-3: Identify the importance of Iterative Process Planning (WBS) and Process Automation for a given specific software application

CO-4: Make use of extensive knowledge on Project Controls like seven core metrics and understand Project Organizations and Responsibilities

UNIT – I:
Conventional Software Management: The waterfall model, conventional software Management performance. Overview of Project Planning – Stepwise Project Planning.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT – II:
The Old Way and The New Way: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, Inception, Elaboration, Construction, Transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT – III:
Work Flows of the Process: Software process workflows, Iteration workflows.

Checkpoints of the Process: Major mile stones, Minor Milestones, Periodic status assessments. Globalization Issues in Project management.

UNIT – IV:

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Process Automation: Automation Building blocks.

UNIT – V:

Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminants. Emerging Trends in Project Management.

UNIT – VI:

Project Organizations and Responsibilities: Line-of-Business Organizations, Understanding Behavior – Organizational Behavior
Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.

TEXT BOOKS:
1. Software Project Management, Walker Royce, Pearson Education, 2005
2. Managing and Global Software Project, Ramesh Gopalaswamy, Tata McGraw Hill, 2003

REFERENCES:
1. Software Project Management, Bob Hughes and Mike Cotterell, Tata McGraw-Hill Edition
2. Software Project Management, Joel Henry, Pearson Education
3. Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005

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(18PE1CS06) SCRIPTING LANGUAGES

COURSE OBJECTIVES:
- To appreciate the nature of scripting and the role of scripting languages
- To effectively apply knowledge of scripting to new situations and learn from the experience
- To analyze requirements of software systems for the purpose of determining the suitability of implementation of PERL and Ruby
- To design and implement software solutions that accommodate specified requirements and constraints, based on analysis or modeling or requirements specification

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Distinguish between typical Scripting Languages & system and application programming languages

CO-2: Apply the syntax and semantics of languages such as PERL and Ruby for effective scripting

CO-3: Develop a Web applications to help in businesses and decision making

CO-4: Design and implement the appropriate software solutions using Scripting Languages such as e-commerce, content management, custom database solutions, and prototyping

UNIT – I:
Introduction to Scripting Language: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages.

UNIT – II:
Fundamentals of Perl: PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT – III:
Advanced Perl: Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT – IV:
Facets of Ruby: Ruby new, Classes, Objects and Variables, Containers, Blocks and Iterators, Standard Types, Methods, Expressions, Exceptions, Catch, And Through, Modules, Basic Input and Output.

UNIT – V:

Ruby in its Setting: The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices

UNIT – VI:

RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.
Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

TEXT BOOKS:

1. The World of Scripting Languages, David Barren, Wiley Publications
2. Programming Ruby, The Pragmatic Programmers Guide, Dabve Thomas, Second Edition

REFERENCES:

1. Perl Example, E. Quigley, Pearson Education
2. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD
3. Ruby Programming Language, David Flanagan and Yukihiro Matsumoto, O'Reilly

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(18PE1IT07) SEMANTIC WEB

COURSE OBJECTIVES:
- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand Semantic Web
CO-2: Learn SOAP, UDDI
CO-3: Handle multiple web services using Orchestration
CO-4: Experiment with XML Technologies
CO-5: Construct and use Ontologies

UNIT – I:
Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

UNIT – II:
Web Services: Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

UNIT – III:
Resource Description Framework: Features, Capturing Knowledge with RDF.
XML Technologies: XPath , The Style Sheet Family: XSL, XSLT, and XSLFO, XQuery, XLink, XPointer . XInclude, XMLBase, XHTML, XForms, SVG.

UNIT – IV:
Taxonomies and Ontologies: Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

UNIT – V:
Semantic Web Application: Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base.

UNIT – VI:
Semantic Search Technology: Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle

TEXT BOOKS:
1. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management, Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, Wiley Publishing

2. Thinking on the Web, Berners Lee, Godel and Turing, Wiley Interscience

REFERENCES:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley & Sons
2. Semantic Web and Semantic Web Services, Li Yang Lu, Chapman and Hall/CRC, Taylor & Francis Group
3. Information Sharing on the Semantic Web, Heiner Stuckenschmidt; Frank Van Harmelen, Springer
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD

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(18PE1EC08) INTERNET OF THINGS

COURSE OBJECTIVES:
- To understand the concepts of Internet of Things and will be able to build IoT applications
- To familiarize with design framework needed to build Internet of Things
- To apply various protocols and connectivity technologies for building IoT

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the concepts of IoT and IoT protocols
CO-2: Design IoT applications in different domains and analyze their performance
CO-3: Implement basic IoT applications on embedded platforms

UNIT – I:
Introduction to Internet of Things: Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Deployment Templates.

UNIT – II:
IoT Protocols: Message Queuing Telemetry Transport (MQTT), Secure Message Queuing Telemetry Transport (SMQTT), Constrained Application Protocol (CoAP), Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP)

UNIT – III:
Connectivity Technologies: IEEE802.15.4, Zigbee, 6LOWPAN, Wireless HART, Z-Wave, ISA 100, Bluetooth, NFC, RFID.

UNIT – IV:
Web of Things: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture

UNIT – V:
Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture

UNIT – VI:
Domain specific applications of IoT: IoT Design Methodology, Applications of IoT– Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

TEXT BOOKS:
1. Internet of Things: A Hands-On Approach, Vijay Madisetti, Arshdeep Bahga
2. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi, Wiley, 2012
3. The Internet of Things in the Cloud: A Middleware Perspective, Honbo Zhou, CRC Press, 2012

REFERENCES:
1. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers
2. Building the Internet of Things, Sara Cordoba, Wimer Hazenberg, Menno Huisman BIS Publishers, 2011
3. Designing the Internet of Things, Adrian Mcewen, Hakin Cassimally, 2015

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(18PE1IT08) SECURITY IN E – COMMERCE

COURSE OBJECTIVES:
- To prepare student to understand current threats facing organizations that conduct business online
- To apply cryptography and related security techniques to e-commerce including secure electronic transactions
- To understand electronic payment systems, intellectual property protection
- To know and understand security development cycle and security services

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understanding the various forms of electronic commerce and explain the range of threats to e-commerce security

CO-2: Remembering the different areas susceptible to malicious activity

CO-3: Analyzing different cryptographic techniques and their technical characteristics w.r.t E-commerce

CO-4: Evaluating how cryptography can be, and is, used to achieve security

UNIT – I:
Introduction to E-Commerce – Network and E-Commerce – Types of E-Commerce – E- Commerce Business Models: B2C, B2B, C2C, P2P and M-commerce business models – E- Commerce Payment systems: Types of payment system – Credit card E-Commerce transactions – B2C E-Commerce Digital payment systems – B2B payment system.

UNIT – II:
Security and Encryption: E-Commerce Security Environment – Security threats in E-Commerce environment – Policies, Procedures and Laws.

UNIT – III:
Inter-organizational Trust in E-Commerce: Need – Trading partner trust – Perceived benefits and risks of Ecommerce – Technology trust mechanism in E-Commerce – Perspectives of organizational, economic and political theories of inter-organizational trust – Conceptual model of inter-organizational trust in Ecommerce participation.

UNIT – IV:
Introduction to Trusted Computing Platform: Overview – Usage Scenarios – Key components of trusted Platform – Trust mechanisms in a trusted platform. Trusted platforms for organizations and individuals –Trust models and the E-Commerce domain.

UNIT – V:

E-Commerce Security: SET for E-Commerce Transactions, Business requirements for SET, SET System Participants, Dual Signature and Signature, Authentication and Message Integrity, Payment Processing.

UNIT – VI:

Secure Internet Programming, Security development life cycle, Internet Security Standards and Internet Security Products, Trusted Internet Security services

TEXT BOOKS:

1. E-Commerce Business Technology Society, Kenneth C. Laudon and Carol Guercio Trave, Pearson Education, 2005
2. Inter-Organizational Trust for Business-to-Business E-Commerce, Pauline Ratnasingam, IRM Press, 2005
3. Trusted Computing Platforms: TCPA Technology in Context, Siani Pearson, et al., Prentice Hall PTR, 2002

REFERENCES:

1. Frontiers Electronic Commerce, Ravi Kalakota and Andrew Whinston, 2nd Edition, Addison, Wesley, 1999
2. E-Commerce, P. T. Joseph, S. J., 2nd Edition, Prentice Hall, 2008
3. E-Commerce Security and Privacy, Anup Gosh, 2001

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(18PE1IT09) DESIGN PATTERNS

COURSE OBJECTIVES:
- To understand design of patterns and solve design problems
- To study creational and structural patterns
- To understand behavioral patterns

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: To explore types of design patterns
CO-2: to examine the case study for designing a document editor
CO-3: to examine the importance of creational and structural patterns
CO-4: to explore the role of behavioral patterns in the given context

UNIT – I:
Introduction: Definition for Design Pattern. Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, Design of Patterns Solve Design Problems, Selection of a Design Pattern, Use of a Design Pattern.

UNIT – II:
A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

UNIT – III:
Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton,

UNIT – IV:
Structural Patterns: Adapter, Bridge, Composite, Decorator, façade, Flyweight, Proxy.

UNIT – V:
Behavioral Patterns Part-I: Chain of Responsibility, Command, Interpreter, Iterator, Mediator

UNIT – VI:
Behavioral Patterns Part-II: Memento, Observer, State, Strategy, Template Method, Visitor,

TEXT BOOK:
1. Design Patterns, Erich Gamma, Pearson Education

REFERENCES:
1. Pattern's in JAVA Vol-I, Mark Grand, Wiley DreamTech

2. Pattern's in JAVA Vol-II, Mark Grand, Wiley DreamTech
3. JAVA Enterprise Design Patterns Vol-III, Mark Grand, Wiley DreamTech
4. Head First Design Patterns, Eric Freeman, Oreilly, SPD
5. Design Patterns Explained, Alan Shalloway, Pearson Education.

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(18PE1CS02) AUGMENTED REALITY AND VIRTUAL REALITY

COURSE OBJECTIVES:
- To provide a detailed understanding of the concepts of Virtual Reality and its applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand geometric modelling and Virtual environment
CO-2: Illustrate Virtual Hardware and Software
CO-3: Develop Virtual Reality applications
CO-4: Implement AR and VR business cases

UNIT – I:
Introduction to Virtual Reality
Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark
3D Computer Graphics: Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, 3D clipping, Colour theory, Simple 3D modelling, Illumination models, Reflection models, Shading algorithms, Radiosity, Hidden Surface Removal, Realism- Stereographic image.

UNIT – II:
Geometric Modelling: Introduction, From 2D to 3D, 3D space curves, 3D boundary representation Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection
Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.

UNIT – III:
Introduction to AR, Definition and Scope A brief history of AR, Examples, Related Fields, MR continuum, Virtual Reality, Ubiquitous Computing

UNIT – IV:
Tracking: Coordinate Systems, Characteristics of Tracking technology, Stationary Tracking systems, Mobile Sensors, Optical Tacking, Sensor Fusion

UNIT – V:
Computer Vision for AR, Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Incremental Tracking, Simultaneous Localization and Mapping, Outdoor Tracking.

UNIT – VI:

The future-What may drive Business Cases, AR developer's Wish List, Tracking AR Outdoors, Interface with Smart Objects

TEXT BOOKS:
1. Virtual Reality Systems, John Vince, Pearson Education, 2007
2. Augmented Reality, Principles and Practices, Dieter Schmalstieg, Tobias Hollerer Pearson, 2017
3. Augmented and Virtual Reality, Anand R., Khanna Publishing House, Delhi

REFERENCES:
1. Visualizations of Virtual Reality, Adams, Tata McGraw Hill, 2000
2. Virtual Reality Technology, Grigore C. Burdea, Philippe Coiffet, Wiley Inter Science, 2nd Edition, 2006
3. Understanding Virtual Reality: Interface, William R. Sherman, Alan B. Craig,
4. Application and Design, Morgan Kaufmann, 2008

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(18PE1IT10) ADHOC AND SENSOR NETWORKS

COURSE OBJECTIVES:
- To learn about the issues and challenges in the design of wireless ad hoc networks
- To understand the working of MAC and Routing Protocols for ad hoc and sensor networks
- To learn about the Transport Layer protocols and their QoS for ad hoc and sensor networks
- To understand various security issues in ad hoc and sensor networks and the corresponding solutions

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify different issues in wireless ad hoc and sensor networks
CO-2: Analyse MAC, Routing, Transport and QoS protocols developed for ad hoc and sensor networks
CO-3: Understand security issues in adhoc and sensor networks
CO-4: Develop the applications and challenges of Adhoc sensor networks

UNIT - I:
MAC & Routing In Ad Hoc Networks: Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols

UNIT – II:
Transport & Qos In Ad Hoc Networks: TCP‟s challenges and Design Issues in Ad Hoc Networks – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model

UNIT – III:
MAC & Routing in Wireless Sensor Networks: Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zigbee – Topology Control – Routing Protocols

UNIT – IV:
Transport & Qos in Wireless Sensor Networks: Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor networks – Examples.

UNIT – V:

Security in Ad Hoc and Sensor Networks: Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks – Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

UNIT – VI:

Applications and Challenges of Ad Hoc and Sensor Networks: Mobile ad hoc networks (MANETs), Vehicular ad hoc networks (VANETs), Smart phone ad hoc networks (SPANs),Wireless mesh networks Army tactical MANETs, Air Force UAV Ad hoc networks, Navy ad hoc networks, Ad hoc home smart lighting, Ad hoc street light networks, Ad hoc networked of robots, Disaster rescue ad hoc network, Hospital ad hoc network, Challenges.

TEXT BOOKS:
4. Ad Hoc Wireless Networks – Architectures and Protocols, C. Siva Ram Murthy and B. S. Manoj, Pearson Education, 2006
5. Protocols and Architectures for Wireless Sensor Networks, Holger Karl, Andreas Willing, John Wiley & Sons, Inc., 2005

REFERENCES:
1. Ad Hoc Mobile Wireless Networks, Subir Kumar Sarkar, T. G. Basavaraju, C Puttamadappa, Auerbach Publications, 2008
2. Ad Hoc and Sensor Networks: Theory and Applications, Carlos De Morais Cordeiro, Dharma Prakash Agrawal, 2nd Edition, World Scientific Publishing, 2011
3. Fundamentals of Wireless Sensor Networks Theory and Practice, Waltenegus Dargie, Christian Poellabauer, John Wiley and Sons, 2010
4. Wireless Ad Hoc and Sensor Networks: Theory and Applications, Xiang-Yang Li, 1227th Edition, Cambridge university Press, 2008

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B.Tech. VII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(18PE1CS16) NATURAL LANGUAGE PROCESSING

COURSE PRE-REQUISITES: Data Structures, Finite Automata and Probability Theory

COURSE OBJECTIVES:
- To introduce the fundamental concepts and ideas in Natural Language Processing (NLP)
- To introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics
- To provide an understanding of the algorithms available for the processing of linguistic information and the underlying computational properties of natural languages
- To study and compare various NLP algorithms and design modelling techniques

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Describe the underlying concepts of Natural Language, Language Model Evaluation, Parameter Estimation
CO-2: Explain the various Issues and Challenges in finding the structure of a word, Morphological Models Finding the Structure of Documents, A Data-Driven Approach to Syntax and Syntactic Structure and Language-Specific Modelling Problems
CO-3: Formulate Parsing Algorithms, Models for Ambiguity Resolution in Parsing, N-Gram Models, Language Model Adaptation
CO-4: Familiarize Multilingual Issues, Word Sense Disambiguation Systems, Multilingual and Cross lingual Language Modelling

UNIT – I:
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

UNIT – II:
Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues.

UNIT – III:
Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT – IV:
Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT – V:

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and structure.

UNIT – VI:

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling.

TEXT BOOKS:

1. Multilingual Natural Language Processing Applications: From Theory to Practice, Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval, Tanvier Siddiqui, U. S. Tiwary

REFERENCES:

1. Speech and Natural Language Processing, Daniel Jurafsky & James H. Martin, Pearson Publications

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(18PE1IT11) NETWORK MANAGEMENT SYSTEM

COURSE OBJECTIVES:
- To develop required skills in the students so that they are able to acquire following competency
- To plan, install, configure, administer and manage a network

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain Directory Services and Remote Access
CO-2: Set-up and use Virtual Private Network
CO-3: Explain Network protocols and services
CO-4: Install and configure Network server operating system
CO-5: Configure various services on Windows server platform and Troubleshoot Network

UNIT – I:
Directory Services: Define Directory Service, Definition of Novelle Directory, Windows Domain, MS Active Directory, X500 Directory Access Protocol, Lightweight Directory Access Proto col, Forests, Trees, Roots and Leaves.
Active Directory Architecture: Object Types, Object Naming, Canonical Names, LDAP Notation, Globally unique identifiers, User Principle Names, Domain, Trees & Forests.
Remote Network Access: Need of Remote Network Access, PSTN, ISDN, DSL, CATV
Virtual Private Network: VPN Protocols, Types of VPN, VPN Clients, SSL VPNs

UNIT – II:
Dynamic Host Control Protocol (DHCP): DHCP Origins, Reverse Address Resolution Protocol (RARP), The Bootstrap Protocol (BOOTP), DHCP Objectives, IP Address assignments, DHCP Architecture
Introduction to Domain Name Systems (DNS): DNS Objectives, Domain Naming, Top Level Domains, Second Level Domains, Sub-domains, DNS Functions, Resource Records, DNS Name Resolution, Resolves, DNS Requests, Root Name Servers, Resolving a Domain Name, DNS Name Registration

UNIT – III:
Network Printing Concepts: Locally Connected Print Devices, Setting up local Print Devices, Shared Print Devices, Sharing Locally Attached Print Devices, Describe Windows Network Printing and Add print Wizard
Designing Network – Accessing Network Needs, Applications, Users, Network Services, Security and Safety, Growth and Capacity Planning, Meeting Network Needs – Choosing Network Type, Choosing Network Structure, Choosing Servers

UNIT – IV:
Installing and Configuring Windows Server -Preparing for Installation, Creating windows server boot disk, Installing windows server, Configuring server/ client.

Setting windows server - Creating Domain controller, Adding the DHCP and WINS roles, Adding file server and print server, Adding Web based Administration

UNIT – V:
Working With User Accounts -Adding a User, Modifying User Account, Deleting or Disabling a User Account. Working with Windows Security Groups –Creating Group, Maintaining Group Membership. Working with Shares –Understanding Share Security, Cresting Shares, Mapping Drives Administering Printer Shares –Setting up Network Printer Working with Windows Backup – Using Windows Servers Backup Software

UNIT – VI:
Understanding the Problem –Troubleshooting, Segmenting the Problem, and Isolating the Problem, Setting Priorities. Troubleshooting Tools –Hardware Tools, Software Tools, Monitoring and Troubleshooting Tools Internal Security –Account Security, File and Directory permissions, Practices and user education

TEXT BOOKS:
1. The Complete Reference Networking, Craig Zacker, Tata McGraw-Hill
2. The Real-World Network Troubleshooting Manual, Alan Sugano, Firewall Media
3. Networking A Beginner's Guide, Bruce Hallberg, Tata McGraw-Hill

REFERENCES:
1. Introduction to Networking, Bruce Hallberg, Tata McGraw-Hill
2. Networking + Certification Training Kit, Richard A. McMahon, Microsoft Press
3. MCSE Training Kit Networking Essential Plus Microsoft Press

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(18PC2IT06) DATA ANALYTICS LABORATORY

COURSE OBJECTIVES:
- To explore basics of R tool
- To understand linear and logistic regression
- To explore decision tree and text mining

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Exploring R to load, explore data and to use in data analytics
CO-2: Analyzing linear and logistic regression techniques
CO-3: Exploring decision tree, clustering and text mining algorithms
CO-4: Analyze Time Series models

LIST OF EXPERIMENTS:

Experiments will be implemented using R/Python.

1. Practicing basic commands in R
2. Loading and handling data using R
3. Exploring datasets using R
4. Implementation of linear regression technique using R/Python
5. Implementation of logistic regression technique using R/Python
6. Implementation of decision tree algorithm/Python
7. Implementation of association rules
8. Exploring time-series models using R
9. Exploring ARIMA model
10. Analyze case studies on time-series models
11. Implementation of clustering algorithms using R/Python
12. Exploring text mining algorithms

TEXT BOOKS:
1. Data Analytics using R, Seema Acharya, McGraw-Hill Education,2019
2. R for Data Science, Import, Hadley Wickham, Garrett Grolemund, Tidy, Transform, Visualize, and Model Data, 2016

REFERENCES:
1. Data Analytics with R, Bharti Motwani, 2019
2. Data Science-Theory, Analysis and Applications, Qurban A. Memon, Shakeel Ahmed Khoja, 2019

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(18PE1IT12) DISTRIBUTED SYSTEMS

COURSE OBJECTIVES:
- To understand foundations of distributed systems
- To introduce the idea of peer-to-peer services and file system
- To understand in detail the system level and support required for distributed system
- To understand the issues involved in studying process and resource management

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Discuss trends in Distributed Systems
CO-2: Apply network virtualization
CO-3: Apply remote method invocation and objects
CO-4: Design process and resource management systems

UNIT – I:
Introduction: Introduction to Distributed Systems Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages& Disadvantage distributed system, Examples of Distributed Systems, Trends in Distributed Systems, Challenges.

UNIT – II:
Process & Resource Management: Process Management: Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

UNIT – III:
Memory Management in Distributed System: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing.

UNIT – IV:
Inter Process Communication in Distributed System: API for internet protocols – External data representation and Multicast communication, Network virtualization, overlay networks, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages, Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms, Bully & Ring Algorithms.

UNIT – V:
Distributed Scheduling and Deadlock Distributed Scheduling- Introduction - Clocks, events and process states, Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion, Issues in Load Distributing, Components for Load Distributing Algorithms, Load Distributing

Algorithms, Task Migration and its issues. Deadlock-Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms.

UNIT – VI:

File Management in Distributed System: Desirable features of good Distributed File System, Introduction File service architecture – Andrew File system, File Accessing Model, File Sharing semantics, File Catching Scheme, File Application   Naming: - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

TEXT BOOKS:

1. Distributed Systems: Principles and Paradigms, Tanenbaum A. S., Van Steen M., Pearson Education, 2007
2. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and Tim Kindberg, 5th Edition, Pearson Education, 2012

REFERENCES:

4. Distributed Operating Systems: Concepts and Design, Pradeep K. Sinha, Prentice Hall of India, 2007
5. Distributed Computing, Principles and Applications, Liu M. L., Pearson Education, 2004
6. Advance Concept in Operating System, Singhal & Shivratari, McGraw Hill
7. Distributed Computing, Attiya & Welch, Wiley

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(18PE1CS10) NEURAL NETWORKS AND DEEP LEARNING

COURSE OBJECTIVES:
- To introduce to the basic concepts of neural networks
- To identify and analyze the various types of neural networks and models of neuron and apply accordingly
- To introduce the concept of deep learning and its types
- To explore the concepts of applications of deep learning

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the basic the concepts of neural networks
CO-2: Analyze various types of neural networks and use various activation functions to solve complex problems
CO-3: Relate the concept of deep learning and its architecture
CO- 4: Design and carry out empirical analysis for various types of applications of deep learning systems

UNIT – I:
Introduction to Neural Networks: Characteristics of Neural Networks, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units.

UNIT – II:
Feed Forward Neural Networks: Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of pattern storage Networks. Analysis of Pattern Mapping Networks.

UNIT – III:
Feedback Neural Networks: Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks. Competitive Learning Neural Networks & Complex pattern Recognition- Introduction, Analysis of Pattern Clustering Networks, Analysis of Feature
Mapping Networks, Associative Memory.

UNIT – IV:
Fundamentals of Deep Learning: Defining Deep Learning, Common architectural principles of Deep Networks, Building Blocks of Deep Networks, and Major architectures of Deep Networks: Unsupervised Pretrained Networks, Convolution Neural Networks (CNNs), Recurrent Neural Networks.

UNIT – V:
Convolution Neural Networks: The convolution operation, motivation, pooling, Convolution and Pooling as an Infinitely Strong Prior, Applications of deep learning:

Large scale deep learning, Computer vision, Speech Recognition, Natural Processing, other applications.

UNIT – VI:

Sequential Modelling: Recurrent Neural Networks: Recursive neural networks, The long short –term Memory, explicit memory, Auto encoders: Under complete, regularised, Stochastic Encoders and Decoders, Denoising Auto encoders

TEXT BOOKS:
1. Artificial Neural Networks, B. Yagna Narayana, PHI,
2. Deep Learning: A Practitioner's Approach, Josh Patterson, Adam Gibson
3. Deep Learning, Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville, An MIT Press Book in Preparation, 2015, http://www.deeplearningbook.org/

REFERENCES:
1. Neural Networks, Simon Haykin, PHI
2. Deep Learning (Adaptive Computation & Machine Learning), Ian Good Fellow, Yoshua Bengio, Aran Courville
3. Fundamentals of Neural Networks: Architectures, Algorithms and Applications, Fausett

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(18PE1CS12) QUANTUM COMPUTING

COURSE OBJECTIVES:
- To provide the basics of quantum computation and its necessity
- To provide the background of mathematics for this kind of computation
- To provide Implication of quantum circuits
- To provide Explore various Quantum algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explore the quantum computation environment
CO-2: Identify the implications of quantum computation in the field of mathematics and associated fields
CO-3: Explore building blocks and programming methodologies for quantum computing
CO-4: Apply quantum computation algorithms and use them

UNIT – I:
Introduction to Quantum Computing: Motivation for studying Quantum Computing, Major players in the industry (IBM, Microsoft, Rigetti, D-Wave etc.), Origin of Quantum Computing, Overview of major concepts in Quantum Computing, Qubits, and multi-qubits states, Bra-ket notation Bloch Sphere representation,

UNIT – II:
Math Foundation for Quantum Computing: Matrix Algebra: basis vectors and orthogonality, inner product and Hilbert spaces, matrices and tensors, unitary operators and projectors, Dirac notation, Eigen values and Eigen vectors.

UNIT – III:
Building Blocks for Quantum Program: Architecture of a Quantum Computing platform, Details of q-bit system of information representation: Block Sphere, Multi-qubits States Quantum superposition of qubits (valid and invalid superposition), Quantum Entanglement, Useful states from quantum algorithmic perceptive e.g. Bell State, Operation on qubits: Measuring and transforming using gates, Quantum Logic gates and Circuit: Pauli, Hadamard, phase shift.

UNIT – IV:
Programming model for a Quantum Computing Program, Steps performed on classical computer, Steps performed on Quantum Computer, Moving data between bits and qubits.

UNIT – V:
Quantum Algorithms: Basic techniques exploited by quantum algorithms, Amplitude amplification, Quantum Fourier Transform, Phase Kick-back, Quantum Phase estimation, Quantum Walks

UNIT – VI:
Major Algorithms: Shor's Algorithm, Grover's Algorithm, Deutsch's Algorithm, Deutsch -Jozsa Algorithm.

TEXT BOOKS:
1. Quantum Computation and Quantum Information, Michael A. Nielsen, Cambridge University Press
2. Quantum Computing Explained, David McMahon, Wiley

REFERENCES:
1. IBM Experience: https://quantumexperience,ng,bluemix.net
2. Microsoft Quantum Development Kit https://www.microsoft.com/en-us/quantum/development-kit
3. Forest SDK PyQuil: https://pyquil.readthedocs.io/en/stable/

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(18PE1IT13) NETWORK SECURITY

COURSE OBJECTIVES:
- To understand security concepts, threats, attacks, services and mechanisms
- To describe various cryptosystems- symmetric key cryptography, public key cryptography
- To apply authentication services, mechanisms and Email security
- To be familiar with the concepts of IP Security, web security, SNMP, viruses and firewalls

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze security issues, services, goals and mechanism of security
CO-2: Develop a security model to prevent, detect the attacks, using various mechanisms
CO-3: Examine the authenticity of the messages, communicate securely and investigate non-repudiation
CO-4: Apply concepts of IP Security, SET, firewalls and establish trusted system

UNIT – I:
Introduction: Security Attacks, Services Mechanisms, A model for Internetwork security, Classical Encryption techniques, Fiestel Cipher Structure, Data Encryption Standard, Block Cipher Design Principles and Modes of Operation, Triple DES, RC-4, Evaluation criteria for AES, AES Cipher, Placement of Encryption Function, Traffic Confidentiality.

UNIT – II:
Public Key Cryptography: Confidentiality using Symmetric Encryption – Principles of Public key Cryptosystems, RSA algorithm, Key Management, Diffie-Hellman key Exchange, Elliptic Curve Cryptography. Buffer overflow, TCP session hijacking, ARP attacks, route table modification, UDP hijacking and man-in-the-middle attacks.

UNIT – III:
Authentication and Hash Functions: Authentication requirements, Authentication functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs, MD5 message Digest algorithm, Secure Hash Algorithm, HMAC.

UNIT – IV:
Digital Signatures and SNMP: Digital Signatures, Authentication Protocols, Digital Signature Standard, Authentication Applications: Kerberos, X.509 Authentication Service, Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3

UNIT – V:
Email Security and Web Security: Electronic Mail Security – PGP/ SMIME, IP security-Architecture, Authentication Header, Encapsulating Security Payload, Key

Management, Web Security- Secure Socket Layer, Transport Layer Security and Secure Electronic Transaction

UNIT – VI:
System Level Security: Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TEXT BOOKS:
1. Cryptography And Network Security – Principles and Practice, William Stallings, 4th Edition, Prentice Hall of India, 2005
2. Hack Proofing Your Network, Ryan Russell, Dan Kaminsky, Rain Forest, Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W. Manzuik and Ryan Permeh, Wiley Dreamtech

REFERENCES:
1. Network Security Essentials: Applications and Standards William Stallings, Prentice Hall, Hardcover, 1999, 366 pages, ISBN 0130160938
2. Security in Computing, Charles B. Pfleeger, Shari Lawrence Pfleeger, 3rd Edition, Pearson Education, 2003
3. Cryptography: Theory and Practice, Douglas R. Stinson, CRC Press, 1995, ISBN 0-8493-8521-0
4. Applied Cryptography, Bruce Schneier, John Wiley & Sons Inc, 2001

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(18PE1IT14) ADVANCED DATABASES

COURSE OBJECTIVES:
- To introduce Distributed Database Management System and its Design issues
- To explore several algorithms for processing queries and be able to use them
- To describe the methods to translate complex conceptual data models into Logical and Physical database designs
- To demonstrate query optimization and its algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Analyze issues related to Distributed database Design

CO-2: Design and develop query processing strategies

CO-3: Apply distributed query optimization strategies

CO-4: Describe transaction processing, concurrency control and reliability in distributed databases

UNIT – I:
Introduction: Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

UNIT – II:
Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.
Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT – III:
Query Processing and Decomposition: Query Processing Objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.

UNIT – IV:
Distributed query Optimization: Query optimization, centralized query optimization, Distributed query optimization algorithms.

UNIT – V:
Transaction Management: Definition, properties of transaction, types of transactions. Distributed concurrency control: Serializability, concurrency control Mechanisms & Algorithms, Time stamped & Optimistic concurrency control Algorithms, Deadlock Management.

UNIT – VI:

Distributed DBMS Reliability: Reliability concepts and measures, failures in Distributed DBMS, local & distributed reliability protocols, dealing with site failures, network partitioning.

TEXT BOOKS:

1. Principles of Distributed Database Systems, M. Tamer OZSU and Patuck Valduriez, Pearson Edn. Asia, 2001
2. Distributed Databases, Stefano Ceri and Willipse Pelagatti, McGraw Hill

REFERENCES:

1. Database System Concepts, Henry F. Korth, A. Silberchatz and Sudershan, MGH
2. Database Management Systems, Raghuramakrishnan and Johhanes Gehrke, MGH
3. Readings in Database Systems, M. Stonebraker, 2nd Edition, Morgan Kauffman, 1993

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(18PE1IT15) DATA VISUALIZATION

COURSE OBJECTIVES:
- To identify the need of core skills for visual analysis
- To describe the techniques in time-series, ranking models
- To define the different types of analysis like deviation, distribution, correlation & multivariate
- To know how to design information dashboards

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the principles of visual perception
CO-2: Apply core skills for visual analysis
CO-3: Analyze visualization techniques for various data analysis tasks
CO-4: Design information dashboard

UNIT – I:
Core Skills for Visual Analysis: Information visualization – effective data analysis – traits of meaningful data – visual perception – making abstract data visible – building blocks of information visualization – analytical interaction – analytical navigation – optimal quantitative scales – reference lines and regions – trellises and crosstabs – multiple concurrent views – focus and context – details on demand – over-plotting reduction – analytical patterns – pattern examples

UNIT – II:
Time-Series, Ranking: Time-series analysis – time-series patterns – time-series displays – time-series best practices – part-to-whole and ranking patterns – part-to-whole and ranking displays – best practices

UNIT – III:
Deviation & Distribution Analysis: deviation analysis – deviation analysis displays – deviation analysis best practices, Distribution analysis – describing distributions – distribution patterns – distribution displays – distribution analysis best practices

UNIT – IV:
Correlation & Multivariate Analysis: Correlation analysis – describing correlations – correlation patterns – correlation displays – correlation analysis techniques and best practices – multivariate analysis – multivariate patterns – multivariate displays – multivariate analysis techniques and best practices

UNIT – V:
Information Dashboard Design I: Information dashboard – categorizing dashboards – typical dashboard data – dashboard design issues and best practices – visual perception – limits of short-term memory – visually encoding data – Gestalt principles – principles of visual perception for dashboard design

UNIT – VI:

Information Dashboard Design II: Characteristics of dashboards – key goals in visual design process – dashboard display media – designing dashboards for usability – meaningful organization – maintaining consistency – aesthetics of dashboards – testing for usability – case studies: sales dashboard, CIO dashboard, Telesales dashboard, marketing analysis dashboard

TEXT BOOKS:

1. Now You See It: Simple Visualization Techniques for Quantitative Analysis, Stephen Few, Analytics Press, 2009
2. Information Dashboard Design: The Effective Visual Communication of Data, Stephen Few, O'Reilly, 2006

REFERENCES:

1. The Visual Display of Quantitative Information, Edward R. Tufte, 2nd Edition, Graphics Press, 2001
2. Data Points: Visualization that Means Something, Nathan Yau, Wiley, 2013
3. Visualizing Data: Exploring and Explaining Data with the Processing Environment, Ben Fry, O'Reilly, 2008
4. Business Analytics for Managers: Taking Business Intelligence Beyond Reporting, Gert H. N. Laursen and Jesper Thorlund, Wiley, 2010
5. The Value of Business Analytics: Identifying the Path To Profitability, Evan Stubbs, Wiley, 2011

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(18PE1CS14) INFORMATION RETRIEVAL SYSTEMS

COURSE OBJECTIVES:
- To describe the differences between repositories like Base Management Systems, Information retrieval systems and data warehouse
- To discover various pre-processing techniques which can apply on text documents to outline the structure of queries and documents
- To articulate fundamental functions used in information retrieval such as automatic indexing, abstracting, and clustering
- To learn the important concepts, algorithms, and data/file structures that are necessary to specify, design, and implement Information Retrieval (IR) systems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify and understand the relationships between various Repository Systems
CO-2: Apply knowledge of data structures and indexing methods in information retrieval Systems
CO-3: Implement various clustering, searching techniques and algorithms on Information systems
CO-4: Analyze clustering techniques and algorithms using evaluation measures

UNIT – I:
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, Information Retrieval System Capabilities – Search, Browse, Miscellaneous.

UNIT – II:
Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction
Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N – gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT – III:
Automatic Indexing: Classes of automatic indexing, Statistical Indexing, Natural language, Concept indexing, Hypertext linkages.
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT – IV:
User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean Systems, Searching the Internet and hypertext.

UNIT – V:

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.

UNIT – VI:

Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

TEXT BOOKS:

1. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T. Maybury, Springer
2. Modern Information Retrieval, Ricardo Baeza – Yates, Pearson Education, 2007

REFERENCES:

1. Information Retrieval: Algorithms and Heuristics, David A Grossman and Ophir Frieder, 2nd Edition, Springer
2. Information Retrieval Data Structures and Algorithms, Frakes, W.B., Ricardo Baeza-Yates: Prentice Hall, 1992

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(18PE1IT16) SOFTWARE DEFINED NETWORKS

COURSE OBJECTIVES:
- To provide a comprehensive introduction to Software Defined Networking (SDN) and presents SDN in context with more familiar network services and challenges
- Ito offer a unique perspective of the business case and technology motivations for considering SDN solutions
- To identify the impact of SDN on traffic management and the potential for network service growth
- To provide the basic concepts and explains the importance of virtualization, particularly the impact of virtualization on servers and networks, service providers, legacy networks, and network vendors

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the main concepts, Virtual and Physical Memory Mapping and motivation towards Software Defined Networking
CO-2: Understand the implementation and design of SDN (Software Defined Networks)
CO-3: Describe the Open Flow Switch Specification and the SDN Controllers
CO-4: Illustrate the concepts of visualization, particularly the impact of visualization on servers and networks, service providers, legacy networks, and network vendors

UNIT – I:
Introduction to Software Defined Networking: Virtualization, Virtual Memory, Virtual Memory Operation, Virtual and Physical Memory Mapping, Server Virtualization, Storage Virtualization, Software Defined Networking, Network Limitations, Network Control Plane.

UNIT – II:
SDN Implementation: Introduction, SDN Implementation, SDN Design, Separation of the Control and Data Planes, Edge-Oriented Networking, SDN Operation, Service Providers and SDN

UNIT – III:
Open Flow: Introduction, Overview of the OpenFlow Switch Specification, OpenFlow Ports, OpenFlow Packet-Processing Pipeline, OpenFlow Channel, Message Handling, OpenFlow Channel Connections, Controller Modes, Auxiliary Connection Use for Performance and Reliability, Flow Table Synchronization, Bundle Messages, OpenFlow Configuration-and- Management Protocol, Remote Configuration and The OpenFlow Conformance Testing Program

UNIT – IV:
SDN Controllers, Network Programmability, The Management Interface, The Application- Network Divide Modern Programmatic Interfaces, Virtualization and Data Plane I/O, Services Engineered Path, Service Locations and Chaining.

UNIT – V:
SDN Evolution Introduction, SDN and Enterprise Networks, SDN and Transport Networks, SDN and Optical Transport Networks, Increasing WAN Utilization with SDN, SDN Scalability Issues, Controller Designs for Scalability, Potential SDN Scalability Issues, Network Types.

UNIT – VI:
SDN Management, Load Adaptation, Google and SDN, Google's G-Scale Network, Google's G-Scale Network Hardware, Google SDN Deployment, Implementation Challenges.

TEXT BOOKS:
1. Software Defined Networking: Design and Deployment, Patricia A. Morreale and James M. Anderson, 1st Edition, CRC Press
2. SDN: Software Defined Networks, Thomas D. Nadeau and Ken Gray, Orielly

REFERENCES:
1. Software Defined Networking with OpenFlow, Siamak Azodolmolky Wiley
2. Software Defined Networks: A Comprehensive Approach, Paul Goransson, Chuck Black, Morgan Kaufmann

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B.Tech. VIII Semester	L	T/P/D	C
	3	0	3

(18PE1CS17) DISTRIBUTED TRUST AND BLOCKCHAIN TECHNOLOGIES

COURSE OBJECTIVES:
- To get the terminologies and overview of block chain technologies
- To study the concepts and foundation of blockchain Technology
- To understand Security Mechanism and Consensus in blockchain
- To design Use Cases and Architecture blockchain Technology

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the concepts related to digital distributed ledger
CO-2: Classify the Byzantine model of fault tolerance mechanisms
CO-3: Apply blockchain scripting language to build Ethereum and its Smart Contracts in application development
CO-4: Design Hyperledger and analyze privacy and security issues

UNIT – I:
Need for Distributed Record Keeping, Byzantine Generals problem Consensus algorithms and their scalability problems, Technologies Borrowed in Blockchain – hash pointers, consensus, digital cash etc.

UNIT – II:
Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems

UNIT – III:
Bitcoin blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use

UNIT – IV:
Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts

UNIT – V:
Hyperledger fabric, Fabric Membership, Fabric Membership, plug and play platform and mechanisms in permissioned blockchain

UNIT – VI:
Pseudo-anonymity vs. anonymity, attacks on Blockchains – such as Sybil attacks, selfish mining, 51% attacks.

TEXT BOOKS:

1. Blockchain Technology: Cryptocurrency and Applications, Oxford University Press, 2019
2. Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming, Josh Thompson, Create Space Independent Publishing Platform, 2017

REFERENCES:

1. Blockchain Quick Reference, Brenn Hill, Samanyu Chopra, Paul Valencourt, Packt Publishing, 2018
2. Blockchain: Blueprint for a New Economy, Melanie Swa, 2015
3. Mastering Bitcoin: Programming the Open Blockchain, Andreas M. Antonopoulos, 2017

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B.Tech. VIII Semester

	L	T/P/D	C
	3	0	3

(18PE1CS19) COGNITIVE ENGINEERING

COURSE OBJECTIVES:
- To identify the basics of Artificial Intelligence and Cognitive science engineering with focus on knowledge representation, and its use by individual minds, brains, and machines
- To analyze the mind and intelligence, embracing psychology, artificial intelligence, neuroscience and linguistics
- To analyze the basics of language acquisition skills and language processing techniques
- To relate the role of Neuroscience in Cognitive field and robotics applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Describe the major concepts and role of computers in Cognitive Science, Nature of Artificial Intelligence, Psychology, Neuroscience, Language Acquisition, Neuropsychology etc
CO-2: Explain the philosophical and theoretical perspectives, Cognitive Architecture, Cognitive Processes, mind organization, cognitive organization, Computation of Cognitive Functioning at machines level
CO-3: Analyze the Information Processing Models of the Mind, Strategies for Brain mapping, various function Nervous System
CO-4: Demonstrate the use of neuroscience in cognitive domain in present industry and also familiar with Cognitive function measurement tools, Robotics and various Challenges

UNIT – I:
Introduction to Cognitive Science and Cognitive Psychology: The Cognitive view – Some Fundamental Concepts – Computers in Cognitive Science – Applied Cognitive Science – The Interdisciplinary Nature of Cognitive Science
Cognitive Psychology – The Architecture of the Mind - The Nature of Cognitive Psychology- A Global View of The Cognitive Architecture.

UNIT – II:
Cognitive Neuroscience: Cognitive Processes, Working Memory, and Attention- The Acquisition of Skill- Brain and Cognition Introduction to the Study of the Nervous System – Neural Representation – Neuropsychology- Computational Neuroscience - The Organization of the mind.

UNIT – III:
Language Acquisition, Semantics and Processing Models:
Language Acquisition: Milestones in Acquisition – Theoretical Perspectives- Semantics and Cognitive Science – Meaning and Entailment, Computational Models of Semantic Processing.

UNIT – IV:

Natural Language Processing and Cognitive Process: Preliminaries, Role of Grammar in Language Processing. Connectionist Models, Information Processing Models of the Mind- Physical symbol systems and language of thought- Applying the Symbolic Paradigm.

UNIT – V:

Higher-Level Cognition and Challenges: Dynamical systems and situated cognition- Challenges – Emotions and Consciousness – Computation of Cognitive Functioning in machines: Robotics, Human-Robotics Interaction.

UNIT – VI:

Cognitive science for vision/image processing: Perception and sensing: visual cognition, cognitive mechanisms of vision, Feature Extraction from Images, Information Processing in Perception and Visual Behavior, Cognitive function measurement tools and software.

TEXT BOOKS:
1. Cognitive Science: An Introduction, Neil Stillings, Steven E. Weisler, Christopher H. Chase and Mark H. Feinstein, Second Edition,1995
2. Cognitive Science: An Introduction to the Science of the Mind, José Luis Bermúdez, Cambridge University Press, New York, 2010
3. Cognitive Science: An Introduction to the Study of Mind, J. Friedenberg and G. Silverman, A Bradford Book, 2006

REFERENCES:
1. Computational Vision: Information Processing in Perception and Visual Behavior, Hanspeter A. Mallot, Translated by John S. Allen
2. How the Mind Works, Steven Pinker, 2009
3. Cognitive Science: An Interdisciplinary Approach, Carolyn Panzer Sobel and Paul Li, 2013
4. Mind: Introduction to Cognitive Science, Paul Thagard, 2nd Edition, MIT Press, 2000
5. The MIT Encyclopedia of the Cognitive Sciences (MITECS), Wilson Robert A., & Keil, Frank C. (eds.), MIT Press, 2001

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B.Tech. VII Semester	L	T/P/D	C
	0	8	4

(18PW4IT05) MAJOR PROJECT PHASE-I

B.Tech. VIII Semester	L	T/P/D	C
	0	12	6

(18PW4IT06) MAJOR PROJECT PHASE-II

COURSE OUTCOMES: After completion of the course, students should be able to
CO-1: Identify and formulate the problem (Industry/technical/societal)
CO-2: Analyze, design and develop a solution to industry/technical/societal problems
CO-3: Implement and execute the solution
CO-4: Demonstrate effective communication skills through oral presentation
CO-5: Engage in effective written communication through project report

COURSE OUTLINE:

- A student shall initiate major project in seventh semester (IV year I semester) and continue it in the eighth semester (IV year II semester).
- Major project shall be carried out in two phases i.e., Major Project Phase-I in the seventh semester and Major Project Phase-II in the eighth semester.
- Major project shall be evaluated for a total of 200 marks. Out of which, Major Project Phase-I shall be evaluated for 100 marks in seventh semester and Major Project Phase-II for 100 marks in eighth semester.
- Evaluation of Major Project Phase-I and Major Project Phase-II shall consist of both CIE and SEE in each semester.
- CIE shall be done by a Project Review Committee (PRC) consisting of Head of the Department, project supervisor and senior faculty member of the Department.
- CIE shall be done on the basis of two seminars conducted in each semester as per the academic calendar and as per the evaluation format provided by the DoA.
- A student shall submit project progress in prescribed report format during each of the project reviews.
- SEE shall be carried out in both Major Project Phase-I and Major Project Phase-II.
- SEE in Major Project Phase-I shall be conducted by a committee consisting of Head of the Department, the project supervisor and one senior faculty of the programme.
- SEE in Major Project Phase-II (project viva-voce) shall be conducted by a committee consisting of an external examiner, Head of the Department, the project supervisor and one senior faculty of the programme.