

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506009
Department of Computer Science & Engineering

B. Tech. (CSE) VIII SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction			Lecture hrs /week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1	PE-VII*	Professional Elective –VII*	3	1	0	4	30	70	4
2	PE-VIII*	Professional Elective – VIII*	3	1	0	4	30	70	4
3	OE-II *	Open Elective – II*	3	0	0	3	30	70	3
4	PW4205CS	Project Work	0	0	10	10	50	100	5
5	MC	Mandatory Non-Credit course	2	0	0	2	30	-	-
Total			11	2	10	23	170	310	16

*(PE-VII) Professional Elective Course– VII	
PE4201CS	Data Science
PE4202CS	Big Data Analytics

*(PE-VIII) Professional Elective Course– VIII	
PE4203CS	Image Processing
PE4204CS	Pattern Recognition

*(OE-II) Open Elective Course– II	
OE4201EE	Non-Conventional Energy Sources
OE4206EC	Basics of IoT
OE4207ME	Basics of Alloy Steel Structures
OE4208EC	VLSI

*(HS-MC) Mandatory Non Credit Course	
MC- 42aHS	Yoga Practice
MC- 42bHS	NSS

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B. Tech. (CSE) VIII SEMESTER
Professional Elective – VII
DATA SCIENCE (PE4201CS)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT – I

Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.

UNIT – II

Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data Sources

UNIT-III

Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms: Linear regression, SVM, Naive Bayes.

UNIT-IV

Data visualization: Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

UNIT-V

Applications of Data Science, Technologies for visualization, Bokeh (Python). Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.

TEXT BOOKS

1. Cathy O’Neil and Rachel Schutt. Doing Data Science, Straight Talk from The Frontline. O’Reilly.
2. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.

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B. Tech. (CSE) VIII SEMESTER
Professional Elective – VII
BIG DATA ANALYTICS (PE4202CS)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT – I

Big Data Analytics: What is big data, History of Data Management; Structuring Big Data; Elements of Big Data; Big Data Analytics; Distributed and Parallel Computing for Big Data;

Big Data Analytics: What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important

UNIT – II

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics; Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

UNIT – III

Understanding Map Reduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize Map Reduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop : Introduction of HDFS, Architecture, HDFS Files, File system types, commands, org.apache.hadoop.io package, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations- Programming with HBase; Installation, Combining HBase and HDFS;

UNIT – IV

Big Data Technology Landscape and Hadoop: NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors; HDFS (Hadoop Distributed File System), HDFS Daemons, read, write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

UNIT – V

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets

TEXT BOOKS

1. Big Data and Analytics, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. Big Data, Black Book™, DreamTech Press, 2015 Edition.
3. Business Analytics 5e, BY Albright |Winston

REFERENCE BOOKS

1. Rajiv Sabherwal, Irma Becerra- Fernandez, "Business Intelligence –Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss, Shaku Atre, "Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.

B. Tech. (CSE) VIII SEMESTER**Professional Elective – VIII****IMAGE PROCESSING (PE4203CS)**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT – I

FUNDAMENTALS OF IMAGE PROCESSING: Fundamental steps in digital image processing, Components of image processing system, A simple image formation model, Image sampling and quantization, Basic relationships between pixels, Introduction to Fourier Transform and DFT – properties of 2D Fourier Transform, FFT.

UNIT – II

IMAGE ENHANCEMENT IN THE SPATIAL AND FREQUENCY DOMAINS: Basic gray – level transformations, Histogram processing, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters, The basics of filtering in the frequency domain, Image smoothing in frequency domain filters, Image sharpening in frequency domain filters.

UNIT – III

IMAGE SEGMENTATION: Fundamentals, Point, Line and edge detection, Thresholding, Region-based segmentation, Segmentation using morphological watersheds, The use of motion in segmentation.

UNIT – IV

IMAGE RESTORATION: A model of image degradation/restoration, Noise models, inverse filtering, wiener filtering, Constrained Least Squares Filtering, Geometric Mean Filter.

IMAGE COMPRESSION: Fundamentals, Huffman coding, Arithmetic coding, Golomb coding, LZW coding, Run-length coding.

UNIT – V

MORPHOLOGICAL IMAGE PROCESSING: Erosion, Dilation, Opening, Closing, The hit-or-miss transformation; Basic morphological algorithms - boundary extraction, hole filling, extraction of connected components, thinning, thickening, skeletons, pruning.

FEATURE EXTRACTION: Background, Boundary preprocessing, Boundary Feature Descriptors, Region Feature Descriptors, Whole-image features.

TEXT BOOKS:

1. Rafeal C Gonzalez and Richard E. Woods, "Digital Image Processing", 4th edition, Pearson Education/ PHI, 2018.

REFERENCE BOOKS:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", 4th edition, Cengage, 2015.
2. Alasdair McAndrew, "Introduction to Digital Image Processing with Matlab", Thomson Course Technology, 2004 Course Technology Press, Boston, MA, United States, 2004.
3. William K. Prat, "Digital Image Processing", 4th edition, Wiley-Interscience, A John Wiley & Sons, Inc., Publication, 2007.

B. Tech. (CSE) VIII SEMESTER
Professional Elective – VIII
PATTERN RECOGNITION (PE4204CS)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT-I

Introduction: Machine perception, Pattern recognition systems, Design cycle, Learning and Adaptation .

Bayesian Decision Theory: Bayesian decision theory: Continuous features, Minimum-error rate classification.

UNIT-II

Classification and Bayes Decision theory: classification, Classifiers, Discriminant functions and Decision surfaces, Normal density, Discriminant functions for normal density, Bayes Decision theory: discrete features, Missing and noisy features;

Maximum Likelihood estimation: General principle, Estimation in Gaussian case.

UNIT-III

Bayesian estimation: Bayesian estimation general theory, Bayesian parameter estimation: Gaussian case, Problems of dimensionality, Principle Component Analysis, Expectation-Maximization (E-M) method.

UNIT-IV

Hidden Markov Model(HMM) and Non parametric estimation: Hidden Markov Model, Working Principle, HMM computation and problems.

Density estimation kn-Nearest- Neighbor estimation, Nearest-Neighbor rule, Metrics and Nearest-Neighbor classification.

UNIT-V

Unsupervised Learning and Clustering: Mixture densities and Identifiability, Maximum-Likelihood estimations, Unsupervised Bayesian learning, Data description and clustering criterion function for clustering, k-means clustering.

TEXT BOOKS

Pattern Classification by Richard O. Duda, Peter E. Hart, David G. Stork, Wiley, 2001.

REFERENCE BOOKS

1. Pattern Recognition : Sergios Theodoridis and Konstantinos Koutroumbas, Elsevier
2. Pattern Recognition and Machine Learning : Christopher Bishop, Springer
3. Pattern Recognition: An algorithmic approach: Murty, M.Narsimha,Devi, V. Susheela, Sringer Pub, 1st Ed.

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B. Tech. (CSE) VIII SEMESTER
Open Elective – II
NON CONVENTIONAL ENERGY SOURCES (OE4201EE)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT-I

Review of Conventional and Non-Conventional energy sources - Need for non-conventional energy sources
Types of Non- conventional energy sources - Fuel Cells - Principle of operation with special reference to H₂O₂ Cell - Classification and Block diagram of fuel cell systems - Ion exchange membrane cell - Molten carbonate cells - Solid oxide electrolyte cells - Regenerative system- Regenerative Fuel Cell - Advantages and disadvantages of Fuel Cells-Polarization - Conversion efficiency and Applications of Fuel Cells.

UNIT-II

Solar energy - Solar radiation and its measurements - Solar Energy collectors -Solar Energy storage systems - Solar Pond - Application of Solar Pond - Applications of solar energy.

UNIT-III

Wind energy- Principles of wind energy conversion systems - Nature of wind - Power in the Wind-Basic components of WECS -Classification of WECS -Site selection considerations -Advantages and disadvantages of WECS -Wind energy collectors -Wind electric generating and control systems - Applications of Wind energy -Environmental aspects.

UNIT- IV

Energy from the Oceans - Ocean Thermal Electric Conversion (OTEC) methods - Principles of tidal power generation -Advantages and limitations of tidal power generation -Ocean waves - Wave energy conversion devices -Advantages and disadvantages of wave energy - Geo-Thermal Energy - Types of Geo-Thermal Energy Systems - Applications of Geo-Thermal Energy.

UNIT-V

Energy from Biomass - Biomass conversion technologies / processes - Photosynthesis - Photosynthetic efficiency - Biogas generation - Selection of site for Biogas plant - Classification of Biogas plants - Details of commonly used Biogas plants in India - Advantages and disadvantages of Biogas generation -Thermal gasification of biomass -Biomass gasifiers.

REFERENCE BOOKS

1. Rai G.D, Non-Conventional Sources of Energy, Khandala Publishers, New Delhi, 1999.
2. M.M. El-Wakil, Power Plant Technology. McGraw Hill, 1984.

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B. Tech. (CSE) VIII SEMESTER

Open Elective – II

BASICS OF IoT (OE4206EC)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT- I

Introduction to Internet of Things: IoT vision, Strategic research and innovation directions, IOT Applications, Related future technologies, Infrastructure, Networks and communications, Processes, Data Management, Security, Device level energy issues.

UNIT- II

Internet Principles and communication technology: Internet Communications: An Overview – IP, TCP, IP protocol Suite, UDP. IP addresses – DNS, Static and Dynamic IP addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols – HTTP, HTTPS, Cost Vs Ease of Production, Prototypes and Production, Open-Source Vs Closed Source.

UNIT- III

Prototyping for IoT: Prototyping Embedded Devices – Sensors, Actuators, Microcontrollers, SoC, Choosing a platform, Prototyping Hardware platforms – Arduino, Raspberry Pi.

UNIT- IV

Cloud computing and Data Analytics: Introduction to Cloud storage models -SAAS, PAAS, and IAAS. Communication APIs, Amazon web services for IOT.

UNIT- V

IoT Product Manufacturing - From prototype to reality: Business model for IoT product manufacturing, Business models canvas, Funding an IoT Startup.

TEXT BOOKS

1. “Internet of Things” - Converging Technologies for smart environments and Integrated Ecosystems, River Publishers.
2. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley India Publishers
3. Daneil W lewies, “Fundamentals of embedded software: where C meets assembly”, Pearson.
4. Arshdeep Bahga, “Internet of things -A hands on Approach” Universities press.

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B. Tech. (CSE) VIII SEMESTER
Open Elective – II
BASICS OF ALLOY STEEL STRUCTURES (OE4207ME)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT-I

Introduction: Level of structures, structure property relationship, Defects in materials, Strengthening Mechanisms.

UNIT-II

The Iron carbon systems: Definition of phase, phase diagram. Iron Carbon phase diagram. Definition of phases in Fe-C system. Concept of steel and Cast Iron. effect of alloying elements on steel

UNIT-III

Heat Treatment of Steels: Annealing, Normalizing, Hardening and tempering. Thermo Mechanical Treatments. Surface Heat Treatments.

UNIT-IV

Steels: Plain Carbon Steels: Low-carbon Mild steels, Medium Carbon Steels, High Carbon Steels, properties and applications of Plain Carbon Steels. High Strength Steels, Tool Steels, Creep Resistance Steel

UNIT-V

Stainless steels: Composition, properties and applications of Austenitic Stainless steel, Ferritic Stainless steel, Martensitic Stainless steel, Precipitation Hardened Stainless steel.

TEXT BOOKS:

1. Introduction to Physical Metallurgy – SH Avner, TATA Mc GRAW HILL ,1997
2. Alloys Steels – Wilson

REFERENCEBOOKS:

1. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007

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B. Tech. (CSE) VIII SEMESTER

Open Elective – II

VLSI DESIGN (OE4208EC)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT –I:

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds} - V_{ds} relationships, MOS transistor threshold Voltage, g_m , g_{ds} , Figure of merit ω_0 ; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT -II:

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μ m CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT –III:

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

UNIT -IV:

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT -V:

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, Contemporary Topics.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, PHI, 2005 Edition
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.
3. VLSI Design – M. Michael Vai, 2001, CRC Press

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design- K .Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
5. Introduction to VLSI – Mead & Convey, BS Publications, 2010.

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B. Tech. (CSE) VIII SEMESTER

Humanity Science Course

YOGA PRACTICE (MC-42aHS)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	0	0	---

UNIT – I

Introduction: Yoga definition, health definition from WHO, yoga versus health, basis of yoga, yoga is beyond science, Gist of eighteen chapters of Bhagavad-Gita, four types of yoga: Karma, Bhakti, Gnyana and Raja yoga, Internal and External yoga, elements of Ashtanga yoga (Yama, Niyama, Asana, Pranayama, Prathyahara, Dharana, Dhyana and Samadhi), Pancha koshas and their purification through Asana, Pranayama and Dhyana.

UNIT – II

Suryanamaskaras (Sun Salutations): Definition of sun salutations, seven chakras (Mooladhaar, Swadhishtaan, Manipura, Anahata, Vishuddhi, Agnya and Sahasrar), various mantras (Om Mitraya, Om Ravaye, Om Suryaya, Om Bhanave, Om Marichaye, Om Khagaye, Om Pushne, Om Hiranya Garbhaye, Om Adhityaya, Om Savitre, Om Arkhaya, and Om Bhaskaraya) and their meaning while performing sun salutations, physiology, seven systems of human anatomy, significance of performing sun salutations.

UNIT – III

Asanas (Postures): Pathanjali's definition of asana, sthiram sukham asanam, 3rd limb of Ashtanga yoga, loosening or warming up exercises, sequence of perform in asanas (standing, sitting, prone, supine and inverted), nomenclature of asanas (animals, trees, rishis and so on), asanas versus chakras, asanas versus systems, asanas versus physical health, activation of Annamaya kosha.

UNIT – IV

Pranayama (Breathing Techniques): Definition of Pranayama as per Shankaracharya, 4th limb of Ashtanga yoga, various techniques of breathing, Pranayama techniques versus seasons, bandhas and their significance in Pranayama, mudras and their significance in Pranayama, restrictions of applying bandhas with reference to health disorders, Pranayama versus concentration, pranayama is the bridge between mind and body, pranayam versus mental health, activation of Pranamaya kosha through Pranayama.

UNIT – V

Dhyana (Meditation): Definition of meditation, 7th limb of Ashtanga yoga, types of mind (Conscious and Sub-Conscious), various types of dhyana. Meditation versus spiritual health, Dharana and Dhyana, extension of Dhyana to Samadhi, Dhyana and mental stress, activation of Manomaya kosha through dhyana, silencing the mind.

SUGGESTED READINGS

1. Light on Yoga by BKS Iyengar.
2. Yoga Education for Children, Vol-1 by Swami Satyananda Saraswati.
3. Light on Pranayama by BKS Iyengar.
4. Asana Pranayama Mudra and Bandha by Swami Satyananda Saraswati.
5. Hatha Yoga Pradipika by Swami Mukhtibodhananda.
6. Yoga education for children, Vol-11 by Swami Niranjanananda Saraswati.
7. Dynamics of Yoga by Swami Satyananda Saraswati.

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B.Tech. (CSE) VIII SEMESTER
Humanity Science course
NSS (MC-42bHS)

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	0	0	

LIST OF ACTIVITIES

1. Orientation program about the role of NSS in societal development.
2. Swachh Bharat Program.
3. Guest lectures from eminent personalities on personality development.
4. Plantation of saplings/Haritha Haram Program.
5. Blood Donation / Blood Grouping Camp.
6. Imparting computer education to school children.
7. Creating Awareness among students on the importance of Digital transactions.
8. Stress management techniques.
9. Health Check-up Activities.
10. Observation of Important days like Voters' day, World Water Day and so on.
11. Road Safety Awareness Programs.
12. Energy Conservation Activities
13. Conducting Programs on effective communication skills.
14. Awareness programs on national integration.
15. Orientation on Improving Entrepreneurial Skills.
16. Developing Effective Leadership skills.
17. Job opportunity awareness programs in various defense, public sector undertakings.
18. Skill Development Program.
19. Creating awareness among students on the Importance of Yoga and other physical activities.
20. Creating awareness among students on various government sponsored social welfare schemes for the people.

Note: At least Ten Activities should be conducted in the Semester. Each event conducted under Swachh Bharat, Plantation and important days like Voters' day, world water day may be treated as a separate activity