

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL506009
Department of Information Technology

B. Tech. (IT) 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	PW4205IT	Project Work	0	0	10	10	50	100	5
5	MC	Mandatory Non-Credit course	2	0	0	2	30	-	-
Total			10	2	11	23	170	310	16

*(PE-VII) Professional Elective – VII	
PE4201IT	Machine Learning
PE4202IT	Data Science

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

*(PE-VIII) Professional Elective– VIII	
PE4203IT	Image Processing
PE4204IT	Cloud Computing

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

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B. Tech. (IT) VII SEMESTER
Professional Elective – VII
MACHINE LEARNING (PE4201IT)

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

UNIT-I

Introduction: Review of Linear Algebra, Definition of learning systems; Designing a learning system, Goals and applications of machine learning; Classification of learning system, Basic concepts in Machine Learning.

UNIT-II

Regression: introduction, Linear Regression, Multivariate Regression.

Decision Tree Learning: Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning,

UNIT-III

Decision Tree Learning: inductive bias in decision tree learning, issues in decision tree learning.

Bayesian learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting Probabilities, minimum description length principle.

UNIT-IV

Bayesian learning: Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, Bayesian belief networks, the EM algorithm.

Artificial Neural Networks: Introduction, neural network representation, appropriate problems for Neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

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.

TEXT BOOKS

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

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B. Tech. (IT) VIII SEMESTER**Professional Elective – VII****DATA SCIENCE(PE4202IT)**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	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. (IT) VIII SEMESTER
Professional Elective – VIII
IMAGE PROCESSING (PE4203IT)

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.

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Department of Information Technology

B.Tech. (IT) VII SEMESTER**Professional Elective – VIII****CLOUD COMPUTING (PE4204IT)**

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

UNIT I

Introduction to Cloud Computing, Roots of Cloud Computing , Layers and Types of Clouds, Desired Features of a Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud.

UNIT II

Principles of Parallel and Distributed Computing : Eras of computing, Parallel vs. distributed computing. Elements of parallel computing, Hardware architectures for parallel processing Approaches to parallel programming Levels of parallelism. Elements of distributed computing Components of a distributed system Architectural styles for distributed computing, Models for inter process communication.

Virtualization Characteristics of virtualized environments, Virtualization and cloud computing Pros and cons of virtualization and Advantages of virtualization

UNIT III

Cloud Architecture- Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing

UNIT IV

Cloud Platforms: Aneka—Integration of Private and Public Clouds

Introduction , Technologies and Tools for Cloud Computing , Aneka Cloud Platform , Aneka Resource Provisioning Service, Hybrid Cloud Implementation , Visionary thoughts for Practitioners

CometCloud: CometCloud Architecture , Autonomic Behavior of CometCloud , Overview of CometCloud-based Applications , Implementation and Evaluation

T-Systems' Cloud-Based Solutions

UNIT V

Cloud Platforms in Industry: Amazon web services: Computer services, Storage services, Communication services

Google App Engine: Architecture and core concepts, Application lifecycle, Cost model

Microsoft Azure: Azure core concepts, SQL Azure, Windows Azure platform appliance

Cloud Applications: Healthcare: ECG analysis in the cloud. Biology: protein structure prediction,

Biology: gene expression data analysis for cancer diagnosis, Geo science: satellite image processing,

Social networking, Media applications

TEXT BOOKS:

1. Cloud Computing (Principles and Paradigms) :Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc
2. Mastering Cloud Computing: Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, McGraw Hill Education 978-1259029950

REFERENCE BOOKS:

1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern• Halper, Wiley Publishing, Inc, 2010
2. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
3. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate

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B. Tech. (IT) 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.

TEXT 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. (IT) 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. (IT) 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. (IT) 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.

B. Tech. (IT) 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 manthras (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, extention 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. (IT) VIII SEMESTER
Humanity Science Course
NSS (MC42bHS)

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

List of Activities:

1. Orientation programs 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