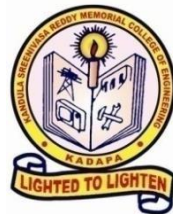


UG Programs in Engineering (R20UG)
Curriculum and Syllabus for
VII - VIII Sem B.Tech
Department of Computer Science and Engineering



KandulaSrinivasa Reddy Memorial College of Engineering (Autonomous)
Kadapa 516003 AP
(Approved by AICTE, Affiliated to JNTUA, Ananthapuramu, Accredited by NAAC)
(An ISO 9001-2008 Certified Institution)

COMPUTER SCIENCE AND ENGINEERING

Approved Course Structure

VII Semester (Theory-06)

S. No	Subject Code	SUBJECT	SC	L	T	P	IM	EM	CR
		Professional Elective Course-III (PEC-III)							
1	2005701	Compiler Design	PEC	3	0	0	40	60	3
	2005702	Computer Graphics	PEC	3	0	0	40	60	3
	2005703	Cyber Security	PEC	3	0	0	40	60	3
		Professional Elective Course-IV (PEC-IV)							
2	2005704	Machine Learning	PEC	3	0	0	40	60	3
	2005705	Object Oriented Analysis & Design	PEC	3	0	0	40	60	3
	2005706	Natural Language Processing	PEC	3	0	0	40	60	3
		Professional Elective Course-V (PEC-V)							
3	2005707	Cloud Computing	PEC	3	0	0	40	60	3
	2005708	Deep Learning	PEC	3	0	0	40	60	3
	2005709	Computer Vision	PEC	3	0	0	40	60	3
		Open Elective Course-III(OEC-III)							
4	200E505	Open Elective Course-III	OEC	3	0	0	40	60	3
	200E506	Open Elective Course-III	OEC	3	0	0	40	60	3
		Open Elective Course-IV(OEC-IV)							
5	200E507	Open Elective Course-IV	OEC	3	0	0	40	60	3
	200E508	Open Elective Course-IV	OEC	3	0	0	40	60	3
		Humanities & Social Science Elective							
6	2006701	Human Resource Development	HSMC	3	0	0	40	60	3
	2006702	Digital Marketing	HSMC	3	0	0	40	60	3
	2006703	Project Management	HSMC	3	0	0	40	60	3
7	2005710	Skill Oriented Course Big Data Technologies	SC	0	0	4	40	60	2
8	2005711	Internship	INT	0	0	0	100	0	3
Total				18	00	4	380	420	23

VIII Semester

S.No.	Subject Code	SUBJECT	SC	L	T	P	IM	EM	CR
1	2005801	Major Project/ Internship (6Months)	PROJ	0	0	3	40	60	12
Total									12

Structure of the Undergraduate Engineering Program:

S.No.	Category	Code	Credits	APSCHE Suggested Credits
1	Humanities & Social Sciences including Management Sciences	HSMC	10.5	10
2	Basic Science Courses	BSC	18	21
3	Engineering Science Courses	ESC	24	24
4	Professional Core Courses	PCC	54	51
5	Open Elective Courses	OEC	12	12
6	Professional Elective Courses	PEC	15	15
7	Internship & Project Work	Proj	16.5	17
8	Mandatory Courses	MC	03	Non-Credit
9	Skill Oriented Courses	SC	10	10
Total Credits			163	160

B.Tech VII SEM CSE (R20)

Course Title	COMPILER DESIGN (Professional Elective Course-III)				B.Tech VII Sem(R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005701	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration:2Hours					End Exam Duration:3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> To make the student to understand the process involved in compilation. Creating awareness among students on various types of parsers. Understand the syntax analysis, intermediate code generation, type checking, and the role of symbol table. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO1	Understand and analyze the various phases of Compiler.							
CO2	Identify the tokens using lexical analyzer techniques.							
CO3	Categorize and implement parsing techniques.							
CO4	Understand syntax directed definition and develop type checking semantics using synthesized and inherited attributes.							
CO5	Understand the storage allocation and intermediate code representations.							
CO6	Summarize the code optimize techniques and demonstrate code generation technique and concepts.							

UNIT-I

Introduction to Compiling :Compilers, Analysis of the Source program, the phases of a compiler, the cousins of the Compiler, grouping of phases, Compiler construction tools.

Lexical Analysis: The role of the analyzer. Input buffering, Specification of tokens, Recognition of tokens, A language for Specifying Lexical analyzer.

UNIT-II

Syntax Analysis: The role of the parser, Context-free grammars writing a grammar, Top down parsing, Bottom-up parsing, Operator-precedence parsing, LR parsers, Parser generators.

UNIT-III

Syntax Directed Translation: Syntax-directed definitions, Construction of syntax trees, S-attributed definitions, L-attributed definitions.

Type Checking: Type systems, Specification of simple type checker, Equivalence of type expressions, type conversions.

UNIT-IV

Run-Time Environments: Source Language issues, storage organization, Storage-allocation strategies, Access to non local names, Symbol tables.

Intermediate Code generation: Intermediate languages, three address code, quadruple, triple and indirect triple.

UNIT-V

Code Generation: Issues in the Design of a code generator, The target machine, Basic blocks and flow graphs, Next-use information, A simple code generator, Register allocation and assignment, DAG representation of basic blocks, peephole optimization.

Code Optimization: Introduction, the principle source of optimization.

TextBook:

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, "Compilers-Principles, Techniques and Tools", Pearson Education.
2. Alfred V.Aho, Jeffrey D.Ullman, "Principles of Compiler Design", Narosa Publications.
3. M. Sreenivasulu, "Compiler Design", Research India Publications.
4. K.V.N.Sunitha, "Compiler Construction", Pearson Education.

ReferenceBooks:

1. Muneeswaran, "CompilerDesign", Oxforward university press
2. Nandini Prasad K S, "Principles of Compiler Design", Cengage Publication.
3. Santanu Chattopadhyay "Compiler Design", PHI.
4. M. Ganga Durga, T.G. Mani Kumar, "Principles of Compiler Design", MJP Publishers.

Course Title	COMPUTER GRAPHICS (Professional Elective Course-III)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005702	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> To apply the rules and algorithms in generating graphical outputs. To develop multi-dimensional objects using suitable transformations. To Develop real-time rendering graphics. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Classify CRT, Color CRT, DVST, Flat Panel display devices and Graphical Input Devices.							
CO 2	Understand DDA, Bresenham's line drawing algorithms and Midpoint circle generating algorithms, clipping of polygons.							
CO 3	Exemplify 2D & 3D translation, rotation, reflection, scaling and shearing.							
CO 4	Compare RGB, CMY, YIQ, CMYK Color models.							
CO 5	Summarize types of animation, Animation sequence and morphing technique.							

UNIT - I

Introduction: Usage of Graphics and their applications, Presentation Graphics- Computer Aided Design- Computer Art- Entertainment- Education and Training- Visualization- Image Processing Graphical User Interfaces.

Overview of Graphics systems: Video Display Devices- Raster Scan systems-random scan systems Graphics monitors and workstations-Input devices-hard copy devices- Graphics software.

UNIT - II

Scan Converting Lines – Basic Incremental algorithm, Midpoint algorithm and additional issues; Scan converting Circles, Scan Converting Ellipses, Solid Filling, Pattern Filling, Thick Primitives, Cohen – Sutherland line clipping algorithm, Parametric line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm, Generating characters.

UNIT - III

Geometrical transformations – 2D transformations, Homogeneous coordinates, Matrix representation of 2D transformations, Composition of 2D transformations, Window to view- port transformation, Matrix representation of 3D transformations, Composition of 3D transformations.

Representing Curves and Surfaces – Polygon meshes, Parametric cubic curves, Parametric bicubic surfaces and Quadratic surfaces.

UNIT - IV

Viewing in 3D – Projections, Specifying an arbitrary 3D view.

Solid Modeling – Representing Solids, Regularized Boolean set operations, Primitive instancing, Sweep Representation, Boundary Representations, Spatial-Partitioning Representations.

Achromatic and Colored Light – Achromatic light, Chromatic color, Color models for raster graphics, Reproducing color, Using color in computer graphics.

UNIT - V

Illumination Models – Ambient light, Diffuse reflection, Atmospheric attenuation.

Shading Models – Constant shading, Interpolated shading, Polygon mesh shading, Gouraud shading, Phong shading.

Animation – Conventional and Computer-Assisted animation, Animation languages, Methods of controlling animation, Basic rules of animation, Problems peculiar to animation.

Text Books:

1. Foley, Van Dam, Feiner and Hughes, Computer Graphics – Principles and Practice, 2nd Edition in C, Pearson Education, 2004
2. Donald Hearn and M. Pauline Baker, Computer graphics, C version, Prentice – Hall.
3. William M. Newman, Robert F. Sproull, Principles of interactive computer graphics, 12th Edition, McGraw – Hill, 1986.
4. David F. Rogers, Rae A. Earnshaw, Computer Graphics Techniques : Theory and Practice, Springer-Verlag, 1990.

Reference Books:

1. Computer Graphics using Open GL by Francis S Hill Jr Pearson Education, 2004.
2. Fundamentals of Computer Graphics, Steve Marschner, Peter Shirley, 4th Edition, CRC Press.
3. Introduction to Computer Graphics: A Practical Learning Approach, Fabio Ganovelli, Massimiliano Corsini, Sumanta Pattanaik, Marco Di Benedetto, CRC Press.
4. Computer Graphics, Amarendra N. Sinha, Arun D Uadi, Tata McGraw Hill.

Course Title	CYBER SECURITY (Professional Elective Course-III)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005703	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> To learn about cybercrimes and how they are planned To learn the vulnerabilities of mobile and wireless devices The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Understanding the basic cyber security concepts.							
CO 2	Classifying the international laws and cyber forensics.							
CO 3	Remembering to cyber-crime.							
CO 4	Recognizing cybercrime and cyber terrorism.							
CO 5	Understanding the privacy issues.							

UNIT - I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

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 and Measures in Mobile Computing Era, Laptops.

UNIT-IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT - V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Text Books:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, ComputerForensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles,Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.
3. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
4. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press.

Reference Books:

1. Cyber Security Engineering: A Practical Approach for Systems and Software Assurance, Nancy R. Meade, Carol C. Woody, Addison Wesley.
2. The Cyber Security: Self help Guide, Arun Soni, CRC Press.
3. Cyber Security: Analytics, Technology & Automation, Martti Lehto, Pekka Neittaanmaki, Springer.
4. Cyber Security: Essentials, Charles J. Brooks, Christopher Grow, Philip Craig, Donald Short, SYBEX.

Course Title	MACHINE LEARNING (Professional Elective Course -IV)				B.Tech CSE VII Sem (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005704	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hours					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> 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: On successful completion of this course, the students will be able to								
CO 1	Understand the machine learning concepts that are suitable for developing real time applications							
CO 2	Understand the concept of decision tree classifier and develop a model for a given problem.							
CO 3	Apply instant based learning to solve a real time problem.							
CO 4	Understand the concepts of probability and Bayes's machine learning algorithms.							
CO 5	Evaluate different clustering algorithms.							

UNIT-I:

Introduction: Introduction to Machine Learning: Introduction, Different types of learning, Applications of Machine Learning, Parametric and Nonparametric Machine Learning Algorithms, Training and test sets, cross validation.

Linear Regression: Simple linear regression, steps in building a regression model, Building simple linear regression model, multiple linear regression, building multiple linear regression model.

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.

UNIT-III:

Instance Based Learning: K nearest neighbor, the Curse of Dimensionality, Over fitting and Under fitting, 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:

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. Tom M.Mitchell, “Machine Learning”, Tom M.Mitchell, McGraw-Hill
2. Manaranjan Pradhan, U Dinesh Kumar, “ Machine Learning using python”, Wiley Publications
3. KevinMurphy, “Machine Learning: A Probabilistic Perspective”, MITPress,2012
4. Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer,2007

Reference Books:

1. Andrews C Muller, Sarah Guido, “Introduction to Machine Learning with Python”, OReilly Publications,
2. Stephen Marshland, “Machine Learning: An Algorithmic Perspective”, Taylor & Francis
3. Peter Flash, Cambridge, “Machine Learning: The Art and Science of Algorithms That Make Sense of Data”, University Press
4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, “The Elements of Statistical Learning”, Springer, 2009.

Course Title	OBJECT ORIENTED ANALYSIS & DESIGN (Professional Elective Course-IV)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005705	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • To understand the Object-oriented life cycle. • To know how to identify objects, relationships, Services and attributes through UML. • To understand different UML diagrams. • To know object-oriented design process, software quality and usability. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Design software applications and document them using UML class diagrams							
CO 2	Analyze, design, document the requirements through use case driven approach.							
CO 3	Identify analyses, and model structural and behavioral concepts of the system.							
CO 4	Apply the concepts of architectural design for deploying the code for software.							
CO 5	Develop; explore the conceptual model into various scenarios and applications.							

UNIT - I

Introduction to UML: Importance of Modeling, Principles of Modeling, Object Oriented Modeling, Conceptual Model of the UML, Architecture.

UNIT - II

Basic Structural Modeling : Classes, Relationships, Common Mechanisms, andDiagrams Interfaces, Types and Roles, Packages.

Class and Object Diagrams : Terms, Concepts, Modeling Techniques for Class andObject Diagrams.

UNIT - III

Basic Behavioral Modeling-I : Interactions, Interaction Diagrams.

Basic Behavioral Modeling-II : Use Cases, Use Case Diagrams, Activity Diagrams.

UNIT - IV

Advanced Behavioral Modeling : Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.

UNIT - V

Architectural Modeling: Component, Deployment, Component Diagrams and Deployment Diagrams, Systems and Models.

Case Stud : The Unified Library Application.

Text Books:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
2. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY-Dreamtech India Pvt. Ltd.
3. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Pearson Education.
4. Modeling Software Systems Using UML2, Pascal Roques, Wiley- Dreamtech India Pvt.Ltd.

Reference Books:

1. Object Oriented Analysis and Design, Atul Kahate, The McGraw- Hill Companies.
2. Object-Oriented Analysis and Design with the Unified Process, John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.
3. Learning UML 2.0, Russ Miles and Kim Hamilton, O'Reilly, SPD.
4. Applying UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.
5. UML and C++, R.C.Lee and W.M.Tepfenhart, PHI.
6. Object Oriented Analysis, Design and Implementation, B.Dathan and S.Ramnath, Universities Press.
7. OO Design with UML and Java, K.Barclay, J.Savage, Elsevier.
8. Mark Priestley: Practical Object-Oriented Design with UML, TMH.

Course Title	NATURAL LANGUAGE PROCESSING (Professional Elective Course-IV)				B. Tech. VII Sem CSE (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005706	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Min					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • Understand approaches to syntax and semantics in NLP. • Understand current methods for statistical approaches to machine translation. • Understand language modeling. • Understand machine learning techniques used in NLP. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Understand the fundamentals required for Computational Linguistics							
CO 2	Understand the concepts of Language design, Text Transformer and their Products							
CO 3	Have the clear idea of language specifications using context and free grammars							
CO 4	Understand machine learning techniques used in NLP							

UNIT I

Introduction to Natural Language Understanding, Syntactic Processing: Grammars and Parsing.

UNIT II

Features and Augmented Grammars, Toward Efficient Parsing, Ambiguity Resolution.

UNIT III

Statistical Methods: Probabilistic Context-Free Grammars, Best-First Parsing.

UNIT IV

Semantic Interpretation: Linking Syntax and Semantics, Ambiguity Resolution, other Strategies for Semantic Interpretation.

UNIT V

Context and World Knowledge: Using World Knowledge, Discourse Structure, Defining a Conversational Agent.

Text Book:

1. Natural Language Understanding – James Allen, Second Edition, Pearson Education.
2. Speech and Language Processing – Daniel Jurafsky, James H.Martin.
3. Foundations of Statistical Natural Language Processing – Christopher Manning, Hinrich Schutze, MIT Press.
4. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.

Reference Books:

1. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2013-2014
2. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.
3. Introduction to Natural Language Processing, Jacob Eisenstein, MIT Press.
4. Natural Language Processing In Action, Hobson Lane, Cole Howard & Hannes Max Hapke, Manning Publications.

Course Title	CLOUD COMPUTING (Professional Elective Course -V)					B.Tech VII Sem (R20) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005707	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> To explain the history of different computing paradigms. To Know about issues and virtualization in cloud. To introduce the various levels of Cloud Services and applications that can be achieved by the cloud. To know about cloud access and security issues. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Recall different Computing Paradigms and overview of cloud computing.							
CO 2	Understanding the Cloud Computing Architecture, network connectivity and cloud migration strategy.							
CO 3	Explain and characterize different cloud deployment models, service models and virtualization.							
CO 4	Understanding Programming models and Software Development in Cloud Computing.							
CO 5	Understanding Cloud Service Providers Google Web Services, AWS and Microsoft cloud Services.							

UNIT-I

Computing Paradigms:

High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Biocomputing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing, Network Computing.

Cloud Computing Fundamentals:

Motivation for Cloud Computing: The Need for Cloud Computing. Defining Cloud Computing: NIST Definition of Cloud Computing, Computing Is a Service, Cloud Computing Is a Platform. Principles of Cloud computing: Five Essential Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services, Cloud Application, Benefits and Drawbacks.

UNIT-II

Cloud Computing Architecture and Management: Cloud Architecture, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Migrating Application to Cloud.

UNIT-III

Cloud Deployment Models: Private Cloud, Public Cloud, Community Cloud, Hybrid Cloud

Cloud Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service, Other Cloud Service Models.

Virtualization: Introduction, Virtualization opportunities, Approaches to Virtualization, Hypervisors, From Virtualization to cloud computing.

UNIT-IV

Programming Models in Cloud: Cloud Application Development Platforms: Windows Azure, Google App Engine, Force.com, Manjrasoft Aneka

Software Development in Cloud: Introduction, Different perspectives on SaaS development, New challenges, Cloud aware software development using PaaS technology.

UNIT-V

Cloud Services : Using Google Web Services – Exploring Google toolkit, Google APIs, Using Amazon Web Services – Understanding AWS, AWS Components and Services, Working with the Elastic Compute Cloud (EC2), Amazon Storage Systems, Amazon Database Services, Using Microsoft Cloud Services – Exploring Microsoft Cloud Services, Defining the Windows Azure Platform.

Text Books:

1. Barrie Sosinsky, “Cloud Computing Bible” ,Wiley publishing.
2. Judith Hurwitz, R Bloor, M.Kanfman, F.Halper “Cloud Computing for Dummies”, Wiley India Edition, First Edition.
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, ”Cloud Computing: Principles and Paradigms”, Wiley Publication,2011.
4. K.Chandrasekaran, Essentials of Cloud Computing, CRC Press, 2015.

Reference Books:

1. Danielle Ruest and Nelson Ruest, “Virtualization: A Beginners’s Guide”, McGraw Hill,2009.
2. Tom White, “Hadoop: The Definitive Guide”, O’RIELLY Media 2009.
3. Nikos Antonopoulos, Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer, 2012.

Course Title	DEEP LEARNING (Professional Elective Course -V)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005708	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • Study the neural networks and convolutions networks and their architecture. • Gain knowledge about recurrent neural networks and deep supervised learning methods. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Understand the neural networks to solve the real time problems.							
CO 2	Understand convolutional neural networks and their architectures.							
CO 3	Understand recurrent neural networks and recursive NNs.							
CO 4	Understand Deep supervised learning methods.							
CO 5	Implement the Deep Learning models in various Applications.							

UNIT - I

Introduction: Feed forward Neural networks, Gradient descent and the back propagation algorithm, Unit saturation, vanishing gradient problem, ways to mitigate it. ReLU Heuristics for avoiding bad local minima, Heuristics for faster training, Nestors accelerated gradient descent, Regularization, Dropout.

UNIT - II

Convolutional Neural Networks : Architectures, convolution / pooling layers

UNIT - III

Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures Recursive neural network (RNN).

UNIT - IV

Deep Unsupervised Learning: Auto encoders (standard, sparse, denoising, contractive, etc), Variational Auto encoders, Adversarial Generative Networks, Autoencoder and DBM Attention and memory models, Dynamic memory networks.

UNIT - V

Applications of Deep Learning to NLP/Computer Vision: Introduction to NLP and Vector Space Model of Semantics, Word Vector representations: Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW), Named Entity Recognition, Opinion Mining using Recurrent Neural Networks, Sentence Classification using Convolutional Neural Networks. Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, Video to text with LSTM models. Attention models for computer vision tasks.

Text Books:

1. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book. (2015).
2. Josh Patterson, Adam Gibson, Deep Learning: A Practitioner's Approach, O'Reilly, 2017.
3. Jeff Heaton, Deep Learning and Neural Networks, Heaton Research Inc, 2015.
4. Mindy L Hall, Deep Learning, VDM Verlag, 2011.

Reference Books:

1. Introduction to Deep Learning, Eugene Charniak, The MIT Press.
2. Deep Learning, D. Kelleher, The MIT Press.
3. Dive into Deep Learning, Joanne Quinn, Joanne McEachen, Michael Fullan, Mag Gardner, Max Drummy, Corwin.

Course Title	COMPUTER VISION (Professional Elective Course -V)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005709	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> To introduce the fundamentals of image formation. To introduce the major ideas, methods, and techniques of computer vision and pattern recognition. To develop an appreciation for various issues in the design of computer vision and object recognition systems. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Identify basic concepts, terminology, theories, models and methods in the field of computervision.							
CO 2	Describe known principles of human visual system.							
CO 3	Describe basic methods of computer vision related to multi-scale representation, edge detectionand detection of other primitives, stereo, motion and object recognition.							

UNIT-I

Image Formation Models: Monocular imaging system, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems.

UNIT-II

Image Processing and Feature Extraction: Image representations (continuous and discrete), Edgedetection.

UNIT-III

Motion Estimation: Regularization theory, Opticalcomputation, StereoVision, Motionestimation, Structure from motion.

UNIT-IV

Shape Representation and Segmentation: Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medialrepresentations, Multiresolution analysis.

UNIT-V

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal Component analysis, Shape priors for recognition.

Text Books:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Richard Szeliski "Computer Vision: Algorithms and Applications" (<http://szeliski.org/Book/>).
3. Haralick& Shapiro, "Computer and Robot Vision", Vol II.

Reference Books:

1. G_eraldMedioni and Sing Bing Kang "Emerging topics in computer vision".
2. Emanuele Trucco and AlessandroVerri "Introductory Techniques for 3-D Computer Vision", Prentice Hall, 1998.
3. Olivier Faugeras, "Three-Dimensional Computer Vision", The MIT Press, 1993.

Course Title	HUMAN RESOURCE DEVELOPMENT (Humanities & Social Science Elective Course)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2006701	HSMC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • To develop capability of all individuals working in an organization in relation to their present role • To develop team spirit. • To develop co-ordination among different units of an organization. • To develop organization health by continuous reveal of individual capability keeping peace with the technological changes. • To develop better interpersonal & employer-employee relationships in an organization. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	To understand key functions in management as applied in practice.							
CO 2	To understand in more specific management related areas from planning till controlling.							
CO 3	To understand about the authority and responsibility, and different organizational structure..							
CO 4	To understand about the role of leadership, motivation and communication in an organization.							
CO 5	To understand the importance of globalization and diversity in modern organizations.							

UNIT-I

Introduction to Human Resource Development: Meaning, significance and objectives of Human Resource Development, Human Resource Management and Human Resource development functions, Human Resource Development challenges.

UNIT-II

HRD Need Assessment & Designing of HRD programs: Strategic/ Organizational Analysis- Task Analysis- Person Analysis- prioritizing HRD needs, defining the objectives of HRD Intervention - Selecting the trainer - Selecting the Training methods - Preparing training material Scheduling an HRD program.

UNIT- III

Implementation &Evaluation of HRD programs: Training methods - Classroom training Approaches - Computer based Training, Purpose of HRD Evaluation- Kirkpatrick's evaluation frame work - Data collection for HRD Evaluation - Assessing the impact of HRD programs in Monetary Terms.

UNIT-IV

Career Management and Development: Introduction to Career management, meaning - Stages of life and Career Development - process of career Development - Issues in career development.

UNIT-V

HRD & Diversity: Introduction – Organizational culture – Labor Market changes and discrimination adapting to demographic changes

Text Books:

1. Jon M Werner,Randy L DeSimone : Human Resource development (Thomson/Cengage)
2. Raymond A Noe : Employee Trainee Development (Tata McGraw Hill)

Reference Books:

1. John P. Wilson Human Resource Development (Kogan Page Business Books)
2. Tripathi P.C : Human Resource Development (Sultan Chand & Sons)
3. Uday Kumar Haldar : Human Resource Development (Oxford)

Course Title	DIGITAL MARKETING (Humanities & Social Science Elective Course)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2006702	HSMC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • To provide foundation in the key concepts on digital marketing. • Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy. • Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan. • Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media • Learn how to measure digital marketing efforts and calculate ROI 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Analyze the confluence of marketing, operations, and human resources in real-time delivery.							
CO 2	Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities.							
CO 3	Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks.							
CO 4	Investigate and evaluate issues in adapting to globalized markets that are constantly changing and increasingly networked.							
CO 5	Interpret the traditional marketing mix within the context of a changing and extended range of digital strategies and tactics.							

UNIT - I

Understanding Digital Marketing Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

UNIT - II

Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Mobile Marketing, Migrating from Traditional Channels to Digital Channels. Marketing in the Digital Era Segmentation – Importance of Audience Segmentation, How Different Segments use Digital Media - Digital Media for Customer Loyalty.

UNIT - III

Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan and Implementing the Plan.

UNIT - IV

Search Engine Marketing and Online Advertising: Importance of SEM, Understanding Web Search – Keywords, HTML Tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost-per-Click), Display Ads - Choosing a Display Ad Format, Landing Page and its Importance.

UNIT - V

Social Media Marketing: Understanding Social Media, Social Networking with Face book, LinkedIn, Blogging as a Social Medium, Social Sharing with YouTube. Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

Text Books:

1. Seema Gupta, Tata McGraw Hill.
2. Dave Chaffey, Pearson Education
3. Dr Antony Puthussery

Reference Books:

1. Kevin Hartman, Digital Marketing Analytics,
2. Digital Marketing – Self learning management series, Vibrant Publishers
3. Digital Marketing, Vandana Ahuja, Oxford publishing house
4. Fundamentals of Digital Marketing, Puneet Singh Batia – Pearson Education
5. Digital Marketing by Seema Gupta (IIM-B)
6. Digital Marketing: Strategy, Implementation & Practice by Dave Chaffey & Fiona Ellis Chad wick
7. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation - Damian Ryan and Calvin Jones.

Course Title	PROJECT MANAGEMENT (Humanities & Social Science Elective Course)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2006703	HSMC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • To impart the basic concepts of Project selection. • To develop an understanding of Project Planning and design, construction and execution, monitoring and control, completion. • To achieve the Project's main goal within the constraints. • To optimize the allocated necessary inputs. • To shape and reform the client's vision or tone got late with the masregards the project's objectives. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Remembering and recalling the principles of project management and methods involved in the process of project management.							
CO 2	Understanding of Project Planning, design, construction, execution, maintaining and controlling							
CO 3	Applying techniques in Project Evaluation, Scheduling And Controlling.							
CO 4	Classifying and analysis risks in Project management and project scheduling							

UNIT-I

Introduction to Project Management: Need for Project management, Taxonomy of project, Project life cycle, Project management Process, Principles of Project Management. Project Identification and Selection, Pre – feasibility study, Project Planning Process, Resources allocation, Project Break-even Point.

UNIT- II

Financial Evaluation of Projects: Cost of the Project, Means of finance, Financial Evaluation of projects – Payback period method, Accounting Rate of Return method, Net Present Value method, Internal Rate of Return method, Benefit Cost Ratio method (Profitability Index), (simple Problems).

UNIT-III

Project Risk & Quality Management: Introduction, Role of Risk management, Risk Identification – Steps in risk management –, Risk analysis (Sensitivity Analysis, Probability Analysis, Mean – Variance Analysis Decision trees, Simulation), Techniques for managing risk. Project Quality Management And Value Engineering: Quality, Quality Concepts and Value Engineering.

UNIT-IV

Project Scheduling (Network Analysis): Development of Project network, Time estimation, Determination of the critical Path, PERT Model, Project Crashing.(Simple Problems).

UNIT-V

Project Execution & PMS: Process Of Project Execution and Control, Project Management Information System (PMIS), Project Performance Measurement and Evaluation (PPME).

Project Management Software: Essential Requirement of Project Management Software, Common Features available in most of the project management software.

Text Books:

1. Project management Best Practices: Achieving Global Excellence by Harold Kerzner; John Wiley & Sons; 3rd edition.
2. Project Management: Engineering, Technology and Implementation: united states Edition by Avraham Shtub and Jonathan F. Bard, Pearson; 1st edition.
3. The Essentials of Project Management by Dennis Lock; Routledge.
4. Prasanna Chandra, Projects, Tata McGraw Hill.
5. Nagarajan K, Project Management 4th edition, New Age International (P) Ltd.
6. L Srinath, PERT/CPM, Affiliated East-West Press 2005.

Reference Books:

1. Project management by Stephen Hartley; Routledge, 4th Edition.
2. Project management: a systems Approach to Planning, Scheduling, and controlling by Harold Kerzner; Wiley; 12th edition.
3. Project Management & Appraisal by Sitangshu Khatua; published by Oxford University.
4. Nicholas J. M. & Steyn H., Project Management, Elsevier, Himalaya publications.
5. Narendra Singh, Project Management and Control, HPH, 2003.
6. Harvey Maylor, Project Management, Pearson Education.
7. Panneer selvam Senthil kumar, Project Management, PHI.

Course Title	BIG DATA TECHNOLOGIES (Skill Advanced Course)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005710	SC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	4		2	40	60
					End Exam Duration: 3Hrs			

Course Objectives:

- Optimize business decisions and create competitive advantage with Big data analytics.
- Practice java concepts required for developing map reduce programs.
- Impart the architectural concepts of Hadoop and introducing map reduce paradigm.
- Practice programming tools PIG and HIVE in Hadoop ecosystem.
- Implement best practices for Hadoop development.

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

CO 1	Understand the installation of VMW is and PIG.
CO 2	Understand and apply the setting up and Installing Hadoop in its three operating modes.
CO 3	Implement the file management tasks in Hadoop.
CO 4	Understand Map Reduce Paradigm.
CO 5	Understand Pig Latin scripts sort, group, join, project, and filter your data.

LIST OF EXPERIMENTS

1. A. To study of Big Data, Why is Big Data, Why Big Data is important?
 B. To study of Big Data Analytics Meet Hadoop and Hadoop Architecture.
2. To study HDFS Commands.
3. Installation of VMW is to setup the Hadoop environment and its ecosystems.
4. A. Perform setting up and Installing Hadoop in its three operating modes.
 - I. Standalone.
 - II. Pseudo distributed.
 - III. Fully distributed.
 B. Use web based tools to monitor your Hadoop setup.
5. Implementing the basic commands of LINUX Operating System
 File/Directory creation, deletion, and update operations.
6. Implement the following file management tasks in Hadoop:
 - I. Adding files and directories
 - II. Retrieving files
 - III. Deleting files

Hint: A typical Hadoop work flow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

7. Run a basic word count Map Reduce program to understand Map Reduce Paradigm.
8. Write a Map Reduce program that mines weather data.

Hint: Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.

9. Implement matrix multiplication with Hadoop Map Reduce.

10. Installation of PIG.

11. Write Pig Latin scripts sort, group, join, project, and filter your data.

12.A. Run the Pig Latin Scripts to find Word Count.

B. Run the Pig Latin Scripts to find a max temp for each and every year.

13. HIVE OPERATIONS

Use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

Text Books:

1. Tom White, Hadoop, "The Definitive Guide" , 3rd Edition, O'Reilly Publications, 2012.
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "Understanding Big Data Analytics for Enterprise class Hadoop and StreamingData", 1st Edition, TMH, 2012.
3. Bart Baesens, Analytics in a Big Data World: The Essential Guide to DataScience and its Applications, Wiley Publications, 2014.
4. Big Data Technologies and Applications, Borko Furht, Flavio Villanustre, Springer.

Reference Books:

1. Hand Book of Big Data Technologies, Albert Y. Zomaya, Sherif Sakr, Springer.
2. Big Data Analytics: Tools and Technology for Effective Planning, Arun K. Somani, Ganesh Chandra Deka, CRC Press.
3. Big Data, Big Analytics, Michael Minelli, Michele Chambers, Ambiga Dhiraj, John Wiley and Sons.

Course Title	INTERNSHIP				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005711	INT	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		--	--	--	3	100	--	100
Internal Assessment								
Course Objectives:								
<ul style="list-style-type: none"> • Develop and improve business skills in communication, technology, quantitative reasoning, and teamwork. • Observe and participate in business operations and decision-making. • Meet professional role models and potential mentors who can provide guidance, feedback, and support. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Assess interests and abilities in their field of study and Integrate theory and practice.							
CO 2	Develop communication, interpersonal and other critical skills in the job interview process.							
CO 3	Acquire employment contacts leading directly to a full-time job following graduation from college.							
CO 4	Identify and carry out performance objectives related to their job assignment.							

Open Elective Course-III (OEC-III)

S.No	Subject Code	Open Elective Course-III(OEC-III)	SC	L	T	P	IM	EM	CR
1	20OE505	Operating System	OEC	3	0	0	40	60	3
2	20OE506	R Programming	OEC	3	0	0	40	60	3

Course Title	OPERATING SYSTEMS (Open Elective Course -III)				B.Tech VII Sem (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE505	OEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid ExamDuration:90 Minutes					EndExamDuration:3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • Have an overview of functions of operating systems. • Have a thorough knowledge of process management and memory management. • To have a thorough knowledge of how handle to deadlocks. • Learn the concepts of files, protection and security. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO1	Understand the basic concepts related to the operating systems.							
CO2	Analyze the various process scheduling algorithms and process synchronization mechanisms.							
CO3	Analyze the various memory management schemes.							
CO4	Understand the ways to deal the deadlocks and the basic concepts related to files inthe system.							
CO5	Analyze the protection and security mechanisms							

UNIT - I

Operating Systems Basics: Operating systems functions, Overview of computer operating systems, distributed systems, operating system services and systems calls, system programs, operating system structure.

UNIT - II

Process Management: Process concepts, scheduling-criteria, algorithms, their evaluation.

Concurrency: Process synchronization, the critical-section problem, Peterson's Solution, semaphores, monitors.

UNIT-III

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, Allocation of frames.

UNIT-IV

Deadlocks: system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

Files: The concept of a file, Access Methods, Directory structure, File system mounting.

UNIT-V

Protection: Protection, Goals of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix.

Security: Security problems, User authentication.

Text Books:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", Eighth edition, John Wiley.
2. Andrew S Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education
3. William Stallings, "Operating Systems: Internals and Design Principles", Sixth Edition 2009, Pearson Education.
4. D.M.Dhamdhere, "Operating Systems, A Concept based Approach", Third Edition, TMH

Reference Books:

1. A.S.Godbole, "Operating Systems", Second Edition, TMH.
2. Operating Systems: A Spiral Approach – Elmasri, Carrick, Levine, TMH Edition
3. Operating Systems – H.M. Deitel, P. J. Deitel, D. R. Choffnes, 3rd Edition, Pearson
4. Operating Systems: A Practical Approach, Rajiv Chopra, 4th Edition, S Chand Publishers

Course Title	R PROGRAMMING (Open Elective Course - III)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE506	OEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • Optimize business decisions and create competitive advantage with Big data analytics. • Practice java concepts required for developing map reduce programs. • Impart the architectural concepts of Hadoop and introducing map reduce paradigm. • Practice programming tools PIG and HIVE in Hadoop ecosystem. • Implement best practices for Hadoop development. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Understand the installation of VMW is and PIG.							
CO 2	Understand and apply the setting up and Installing Hadoop in its three operating modes.							
CO 3	Implement the file management tasks in Hadoop.							
CO 4	Understand Map Reduce Paradigm.							
CO 5	Understand Pig Latin scripts sort, group, join, project, and filter your data.							

UNIT-I

Introduction to R: What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed.packages(), packageDescription(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and -inf.

UNIT-II

R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame – **R - Variables:** Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables - **R Operators:** Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators - **R Decision Making:** if statement, if – else statement, if– else if statement, switch statement – **R Loops:** repeat loop, while loop, for loop - Loop control statement: break statement, next statement.

UNIT-III

R-Function : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values - **R-Strings** – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower() - **R Vectors** – Sequence vector, rep function, vector access, vector names, vector math, vector recycling, vector element sorting - **R List** - Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector - **R Matrices** – Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division- **R Arrays**: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements - **R Factors** –creating factors, generating factor levels gl().

UNIT-IV

Data Frames –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame, **Expand Data Frame**: Add Column, Add Row - Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().

Loading and handling Data in R: Getting and Setting the Working Directory – getwd(), setwd(), dir() - **R-CSV Files** - Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File –**R -Excel File** – Reading the Excel file.

UNIT-V

Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode - **Standard Deviation – Correlation - Spotting Problems in Data with Visualization**: visually Checking Distributions for a single Variable - **R – Pie Charts**: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart – **R Histograms** – Density Plot - **R – Bar Charts**: Bar Chart Labels, Title and Colors.

Text Books:

1. ROBERT I. KABACOFF "R in Action Data analysis and graphics with R" Manning Publications Co 2011
2. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN:978-93-5260-524-8.
3. Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), *RProgramming*, Retrieved from https://www.tutorialspoint.com/r/r_tutorial.pdf.
4. Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN: 978-1-119-05580-8

Open Elective Course-IV (OEC-IV)

S.No	Subject Code	Open Elective Course-IV(OEC-IV)	SC	L	T	P	IM	EM	CR
1	20OE507	Python Programming	OEC	3	0	0	40	60	3
2	20OE508	Cloud Computing	OEC	3	0	0	40	60	3

Course Title	PYTHON PROGRAMMING (Open Elective Course -IV)				B. Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE507	OEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Mins					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> • Understand programming skills using basics of Python language • Acquire basics of how to use collection data types of python language. • To Introduce the object-oriented programming concepts. • To understand Python Libraries NumPy and Pandas. • To design a client server model using network Programming in python. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Demonstrate and acquire knowledge on usage of Data types, operators, input and output statements in python programming.							
CO 2	Identify the right sequences of python language in problem solving.							
CO 3	Apply object-oriented features to solve real time applications							
CO 2	Analyze the given problem and develop python program to solve the problem							
CO 4	Able to use Numerical Python (NumPy) Library for data processing.							
CO 5	Apply network programming features of python for Internet applications							

UNIT-I

Introduction: Data Types, Object References, Collection Data Types, Logical Operations, Control Flow Statements, Arithmetic Operators, Input/Output, Creating and Calling Functions.

UNIT-II

Collection Data Types: Sequence Types, Set Types, Mapping Types, Iterating and Copying Collections, Control Structures, Exception Handling, Custom Functions, Modules and packages.

UNIT-III

File Handling and OOP: Writing and Parsing Text Files, Object Oriented Approach, Concepts and Terminology, Attributes and Methods, Inheritance and Polymorphism, Using properties to control attribute access, creating complete fully integrated data types.

UNIT-IV

NumPy Basics: The NumPy ndarray, Creating ndarray, Data Types for ndarray, Operations between Arrays and Scalars, Basic Indexing and Slicing, Boolean Indexing, Universal Functions, Data Processing using Arrays.

UNIT-V

Introduction to Internet Programming: What is Client/Server Architecture? Sockets: Communication End points, Network Programming in Python: Socket() Module Function, Socket Object Built-In Methods, creating a TCP Server, creating a TCP Client. [Text Book 4]

Text Books:

1. Programming in Python 3, A complete Introduction to Python Language by Mark Summerfield, Pearson Publications, second edition, 2018
2. Core python programming by Wesley J Chun, Prentice Hall, Second edition.
3. Python for Data Analysis by Wes McKinney, O'Reilly, First Edition.
4. Core Python Applications Programming by Wesley J. Chun, Third Edition.

Reference Books:

1. Introduction to Computation and Programming using Python, by John Guttag, PHI Publisher.
2. Learning python, Mark Lutz, O'Reilly publications, 5th edition, 2013
3. Python: The complete reference by Martin C Brown, McGraw-Hill Publication, 2018.
4. Core python programming by Dr. R. Nageswara Rao, Dreamtech press, second edition, 2018.

Course Title	CLOUD COMPUTING (Open Elective Course -IV)					B.Tech VII Sem (R20) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE508	OEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
Course Objectives:								
<ul style="list-style-type: none"> To explain the history of different computing paradigms. To Know about issues and virtualization in cloud To introduce the various levels of Cloud Services and applications that can be achieved by the cloud. To know about cloud access and security issues. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Recall different Computing Paradigms and overview of cloud computing.							
CO 2	Understanding the Cloud Computing Architecture, network connectivity and cloud migration strategy.							
CO 3	Explain and characterize different cloud deployment models, service models.							
CO 4	Understanding virtualization, Programming models and Software Development in Cloud Computing.							
CO 5	Understanding Cloud Service Providers AWS and Microsoft cloud Services.							

UNIT-I

Computing Paradigms, Cloud Computing Fundamentals, Motivation for Cloud Computing: The Need for Cloud Computing. Defining Cloud Computing: NIST Definition of Cloud Computing, Computing Is a Service, Cloud Computing Is a Platform. Principles of Cloud computing: Five Essential Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services, Cloud Application, Benefits and Drawbacks.

UNIT-II

Cloud Computing Architecture and Management: Cloud Architecture, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Migrating Application to Cloud.

UNIT-III

Cloud Deployment Models: Private Cloud, Public Cloud, Community Cloud, Hybrid Cloud..

Cloud Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service, Other Cloud Service Models.

UNIT-IV

Virtualization: Introduction, Virtualization opportunities, Approaches to Virtualization, Hypervisors, From Virtualization to cloud computing.

Programming Models in Cloud: Cloud Application Development Platforms: Windows Azure, Google App Engine, Force.com, Manjrasoft Aneka.

Software Development in Cloud: Introduction, Different perspectives on SaaS development, New challenges, Cloud aware software development using PaaS technology.

UNIT-V

Cloud Services : Using Amazon Web Services – Understanding AWS, AWS Components and Services, Working with the Elastic Compute Cloud (EC2), Amazon Storage Systems, Amazon Database Services, Using Microsoft Cloud Services – Exploring Microsoft Cloud Services, Defining the Windows Azure Platform.

Text Books:

1. Barrie Sosinsky, “Cloud Computing Bible” ,Wiley publishing.
2. Judith Hurwitz, R Bloor, M.Kanfman, F.Halper “Cloud Computing for Dummies”, Wiley India Edition, First Edition.
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, ”Cloud Computing: Principles and Paradigms”, Wiley Publication,2011.
4. K.Chandrasekaran, Essentials of Cloud Computing, CRC Press, 2015.

Reference Books:

1. Danielle Ruest and Nelson Ruest, “Virtualization: A Beginners’s Guide”, McGraw Hill, 2009.
2. Tom White, “Hadoop: The Definitive Guide”, O’RIELLY Media 2009.
3. Nikos Antonopoulos, Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer, 2012.

B.Tech VIII SEM CSE (R20)

Course Title	MAJOR PROJECT					B.Tech VIII Sem (R20) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005801	PROJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3				
Internal Assessment:40					External Assessment:60			
Course Objectives:								
<ul style="list-style-type: none"> Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. Acquire and apply new knowledge as needed, using appropriate learning strategies. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Demonstrate a sound technical knowledge of their selected project topic.							
CO 2	Understand problem identification, formulation and solution							
CO 3	Design engineering solutions to complex problems utilizing a systems approach.							
CO 4	Communicate with engineers and the community at large in written and oral form							
CO 5	Demonstrate the knowledge, skills and attitudes of a professional engineer							

GUIDELINES FOR PROJECT

The prime objective of the project work is to imbibe students with technical, analytical and innovative ideas. The students will be able to learn theoretical and practical approaches pertaining to software applications development. A team of 4-5 students formed as a group and work under the supervision of a departmental faculty. Associating the students to solve real world problems identified within the department. The project work normally includes:

1. Literature survey on existing problem/ topic from viable sources.
2. Eliciting the problem-solving approach/methodologies and making the feasibility study.
3. The team should perform an extensive software requirements analysis.
4. Preparing an abstract on the selected topic and present before Departmental Review Committee(DRC).
5. Preparing a roadmap to design, analyze, implement, evaluate/test considering functional, non-functional aspects and finally, deploy the application/product/software service.
6. Detailed Analysis/Design /Simulation as needed.
7. Final development of product/process conducting testing and specifying the results, conclusions and future scope.

8. Preparing a project report in the standard format for being evaluated by the Department Review Committee (DRC).
9. Final Project presentation / execution before Departmental Review Committee (DRC)

Course Title	INTERNSHIP (6 Months)				B.Tech VII Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005801	INT	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		--	--	--	12	40	60	100
Internal Assessment: 40					External Assessment: 60			
Course Objectives:								
<ul style="list-style-type: none"> • Develop and improve business skills in communication, technology, quantitative reasoning, and teamwork. • Observe and participate in business operations and decision-making. • Meet professional role models and potential mentors who can provide guidance, feedback, and support. 								
Course Outcomes: On successful completion of this course, the students will be able to								
CO 1	Assess interests and abilities in their field of study and Integrate theory and practice.							
CO 2	Develop communication, interpersonal and other critical skills in the job interview process.							
CO 3	Acquire employment contacts leading directly to a full-time job following graduation from college.							
CO 4	Identify and carry out performance objectives related to their job assignment.							