

**COURSE STRUCTURE  
& DETAILED SYLLABUS  
(R20 Regulation)  
For  
Bachelor of Technology  
I, II, III & IV B. Tech. (CSE) with  
Honors and Minors  
(Applicable for Batches Admitted from 2020-2021)**

**Department of  
COMPUTER SCIENCE & ENGINEERING  
(Applicable for Batches Admitted from 2020-2021)**



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA  
VIZIANAGARAM - 535003, Andhra Pradesh, India**

**UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**COMPUTER SCIENCE AND ENGINEERING (CSE)**

**R 20 Course Structure**

**I B. Tech I Semester**

S. No	Course Code	Course Title	L	T	P	C
1	R2011BS01	Calculus and Differential Equations	3	0	0	3
2	R2011BS06	Applied Chemistry	3	0	0	3
3	R2011ES15	Problem solving and Programming using C	3	0	0	3
4	R2011ES16	Computer Engineering Workshop	1	0	4	3
5	R2011HS01	Communicative English	3	0	0	3
6	R2011HS01A	English Communication Skills Lab	0	0	3	1.5
7	R2011BS06A	Applied Chemistry lab	0	0	3	1.5
8	R2011ES15A	Problem solving and Programming using C Lab	0	0	3	1.5
9	R2011MC01	Environmental Science	2	0	0	0

**Total = 19.5**

Category	Credits
Basic Science Course	7.5
Engineering Science Courses	7.5
Humanities & Social Science	4.5
<b>Total Credits</b>	<b>19.5</b>

**I B. Tech II Semester**

S. No	Course Code	Course Title	L	T	P	C
1	R2012BS02	Linear Algebra and Numerical Methods	3	0	0	3
2	R2012BS04	Applied Physics	3	0	0	3
3	R2012ES17	Digital Logic Design	3	0	0	3
4	R2012ES18	Data Structures through C++	3	0	0	3
5	R2012ES19	Linux and System Administration	1	0	4	3
6	R2012BS04A	Applied Physics Lab	0	0	3	1.5
7	R2012ES17A	Digital Logic design Lab	0	0	3	1.5
8	R2012ES18A	Data Structure through C++ Lab	0	0	3	1.5

**Total= 19.5**

Category	Credits
Basic Science Course	7.5
Engineering Science Courses	7.5+4.5=12
Humanities & Social Science	00
<b>Total Credits</b>	<b>19.5</b>

**Semester III (Second year)**

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	R2021BS01	Discrete Mathematical Structures	3	0	0	3
2	R202105PC01	Java Programming	3	0	0	3
3	R202105PC02	Database Management Systems	3	0	0	3
4	R202105PC03	Advanced Data Structures	3	0	0	3
5	R202105PC04	Computer Organization & Architecture	3	0	0	3
6	R202105PC01A	Java Programming LAB	0	0	3	1.5
7	R202105PC02A	Advanced Data Structures LAB	0	0	3	1.5
8	R202105PC03A	Database Management Systems LAB	0	0	3	1.5
9	R202105SC01	Introduction to Python Programming	1	0	2	2
10	R2021MC01	Constitution of India	2	0	0	0
					<b>Total Credits</b>	<b>21.5</b>

Category	CREDITS
Basic Science course	3
Professional core Courses	16.5
Skill oriented course*	2
<b>Total Credits</b>	<b>21.5</b>

**Semester IV (Second Year)**

S.No	Course Code	Course Title	Hours			Credits
			L	T	P	C
1	R2022BS01	Probability and Statistics	3	0	0	3
2	R202205ES01	Operating Systems	3	0	0	3
3	R202205PC01	Formal Languages and Automata Theory	3	0	0	3
4	R202205PC02	Computer Networks	3	0	0	3
5	R2022HS01	Managerial Economics and Financial Accountancy	3	0	0	3
6	R202205ES01A	Statistics with R Programming LAB	0	0	3	1.5
7	R202205PC01A	Computer Networks LAB	0	0	3	1.5
8	R202205PC02A	Operating Systems Lab	0	0	3	1.5
9	R202205SC01	Basic Web Designing	1	0	2	2
<b>Total Credits</b>						<b>21.5</b>
<b>Internship 2 Months (Mandatory) during summer vacation</b>						
<b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b>			3	1	0	4

Category	CREDITS
Basic Science Courses	3
Professional Core Courses	9
Engineering Science Courses	4.5
<b>Skill oriented Course*</b>	2
Humanities and Social Sciences	3
<b>Total Credits</b>	<b>21.5</b>

### Semester V (Third Year)

S No	Course Code	Course Title	Hours			Credits
			L	T	P	C
1	R203105PC01	Design And Analysis of Algorithms	3	0	0	3
2	R203105PC02	Compiler Design	3	0	0	3
3	R203105PC03	Data Mining & Data Warehousing	3	0	0	3
4	R203105OE01	Open Elective Course/ <b>Job Oriented Elective:</b> 1.Networking Essentials 2.Advanced Java Programming 3.DevOps 4.Advanced Web Technologies	2	0	2	3
5	R203105PE01	<b>Professional Elective Courses:</b> 1.Artificial Intelligence 2.Principals of Programming Languages 3.Computer Graphics 4. Embedded Systems	3	0	0	3
6	R203105PC01A	Compiler Design Lab	0	0	3	1.5
7	R203105PC02A	Data Mining Lab	0	0	3	1.5
8	R203105SC01	Advanced Python Programming	1	0	2	2
9	R2031MC01	Professional Ethics and Human Values	2	0	0	0
<b>Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)</b>			0	0	0	1.5
<b>Total Credits</b>						<b>21.5</b>
<b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b>			3	1	0	4

Category	CREDITS
Professional core Courses	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
<b>Skill advanced course/ soft skill course*</b>	2
Summer Internship	1.5
<b>Total Credits</b>	<b>21.5</b>

**Semester VI (Third Year)**

SNo	Course Code	Course Title	Hours			Credits
			L	T	P	C
1	R203205PC01	Software Engineering	3	1	0	3
2	R203205PC02	Machine Learning	3	0	0	3
3	R203205PC03	Cryptography & Network Security	3	0	0	3
4	R203205OE01	<b>Professional Elective courses:</b> 1.Distributed Systems 2.Advanced Computer Networks 3.Human Computer Interaction	3	0	0	3
5	R203205PE01	<b>Open Elective Course/Job oriented elective:</b> 1.Programmable Logic Controllers and Applications 2.Mobile Application Development 3.NoSQL Databases	2	0	2	3
6	R203205PC01A	Software Engineering Lab	0	0	3	1.5
7	R203205PC02A	Machine Learning Lab	0	0	3	1.5
8	R203205PC03A	Cryptography & Network Security Lab	0	0	3	1.5
9	R203205SC01	Advanced Communication Skills Lab	1	0	2	2
10	R2032MC01	Intellectual Property Rights and Patents	2	0	0	0
<b>Total Credits</b>						<b>21.5</b>
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Industrial/Research Internship (Mandatory) 2 Months during summer vacation</b>						

Category	CREDITS
Professional core courses	13.5
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
<b>Skill advanced course/ soft skill course*</b>	2
Mandatory course (AICTE)	0
Industrial/Research Internship (Mandatory) 2 Months	-
<b>Total Credits</b>	<b>21.5</b>

**Semester VII  
(Fourth Year)**

SNo	Course Code	Course Title	Hours			Credits
			L	T	P	C
1	R204105PE01	<b>Professional Elective Courses</b> 1.Unified Modeling Language & Design Patterns 2.Software Testing Methodologies 3.Software Project Management	3	0	0	3
2	R204105PE02	<b>Professional Elective Courses</b> 1.Big Data Analytics 2.Advanced Computer Architecture 3.Block Chain Technologies	3	0	0	3
3	R204105PE03	<b>Professional Elective Courses</b> 1.Cloud Computing 2.Cyber Laws 3.Soft Computing	3	0	0	3
4	R204105OE01	<b>Open Elective Courses/ Job Oriented Elective</b> 1.Ethical Hacking 2.Human Resources Development 3.Mean Stack Technologies	2	0	2	3
5	R204105OE02	<b>Open Elective Courses/Job Oriented Elective</b> 1.Scripting Languages 2.Industrial Robotics 3.Program Analysis	2	0	2	3
6	R204105HS01	Management and Organization Behavior	3	0	0	3
7	R204105SC01	Employability Skills	1	0	2	2
<b>Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)</b>			0	0	0	3
<b>Total Credits</b>						<b>23</b>
<b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b>			<b>3</b>		<b>0</b>	<b>4</b>

**\*There is a provision for the Universities/Institutions to implement AICTE mandatory course 1.“Universal Human Values 2: Understanding Harmony” under Humanities and social science Elective in seventh semester for 3 credits.**

Category	CREDITS
Professional Elective Courses	9
Open Elective Course/Job Oriented Elective	6
Humanities and Social Science Elective	3
Skill Advanced Course/ Soft Skill Course*	2
Industrial/Research Internship	3
<b>Total Credits</b>	<b>23</b>

**Semester VIII  
(Fourth year)**

S.No	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	
1	Major Project	R204205P R01	Project Project Work, Seminar, and Internship in Industry	0	0	0	12
<b>INTERNSHIP (6 MONTHS)</b>							
<b>Total Credits</b>							<b>12</b>



**HONOR DEGREE IN COMPUTER SCIENCE AND ENGINEERING**

				Credits
				C
L	T	P		
<b>Computer Networks</b>				
<b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b> <b>1. Data Communication</b> <b>2. Internetworking TCP/IP</b> <b>3. Network Programming</b> <b>4. Wireless Network Technologies</b> <b>5.02 MOOCS courses @ 2credits each</b> <b>(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)</b>				4

				Credits
				C
L	T	P		
<b>Cyber Security</b>				
<b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b> <b>1. Cyber Security Essentials</b> <b>2. Secure Coding</b> <b>3. Vulnerability Assessment &amp; Penetration Testing</b> <b>4. Malware Analysis</b> <b>5.02 MOOCS courses @ 2credits each</b> <b>(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)</b>				4

				Credits
				C
L	T	P		
<b>Pattern Recognition</b>				
<b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b> <b>1. Digital Image Processing</b> <b>2. Bio metrics</b> <b>3. Speech Processing</b> <b>4. Advanced Computer Vision</b> <b>5.02 MOOCS courses @ 2credits each</b> <b>(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)</b>				4

				Credits		
			L	T	P	C
<b>Data Science</b>						
<b>Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)</b>			3	1	0	4
<b>1. Mathematical Essential for Data Science</b> <b>2. Introduction to Data Science</b> <b>3. Data Analytics and Visualization</b> <b>4. Python for Data Science (2+4)</b> <b>5. 02 MOOCS courses @ 2credits each</b> (Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)						

### **MINOR DEGREE IN COMPUTER SCIENCE AND ENGINEERING**

#### Minor Degree in Computer Science and Engineering (For non CSE/IT Students)

S.No	Subject Title	L	T	P	C
1	Data Structures	3	1	0	4
2	Database Management Systems	3	1	0	4
3	Operating Systems	3	1	0	4
4	Computer Networks	3	1	0	4
5	02 MOOCS courses @ 2credits each (Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)				4
<b>Grand Total</b>					<b>20</b>

#### I) Artificial Intelligence

S.No	Subject Title	L	T	P	C
1	Introduction to Artificial Intelligence	3	0	0	3
2	Mathematics for Machine Learning	3	0	0	3
3	Machine Learning	3	0	2	4
4	Deep Learning	3	0	0	3
5	02 MOOCS courses @ 2credits each (Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)				4
<b>Grand Total</b>					<b>20</b>

## II) Computer Security

S.No	Subject Title	L	T	P	C
1	Cyber Security	3	0	0	3
2	Cyber Crime Investigation and Digital Forensics	3	0	0	3
3	Cryptography and Applications	3	0	2	4
4	Block Chain Technology	3	0	0	3
5	02 MOOCS courses @ 2credits each (Any CSE/IT related <b>Program Core subject</b> from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)				4
<b>Grand Total</b>					<b>20</b>

## III) Programming and Web Development

S.No	Subject Title	L	T	P	C
1	Object Oriented Programming through Java	3	0	0	3
2	Python Programming	3	0	0	3
3	Basic Web Designing	3	0	0	4
4	Advanced Web Technologies	3	0	0	3
5	02 MOOCS courses @ 2credits each (Any CSE/IT related <b>Program Core subject</b> from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)				4
<b>Grand Total</b>					<b>20</b>

## IV) Advanced Computing

S.No	Subject Title	L	T	P	C
1	Computer Organization and Architecture	3	0	0	3
2	Client Server Computing	3	0	0	4
3	Distributed Systems	3	0	0	3
4	Cloud Computing	3	0	0	3
5	02 MOOCS courses @ 2credits each (Any CSE/IT related <b>Program Core subject</b> from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)				4
<b>Grand Total</b>					<b>20</b>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		3	0	0	3
<b>CALCULUS AND DIFFERENTIAL EQUATIONS</b>					

(Common to all branches)

### Course Objectives:

- i. This course will illuminate the students in the concepts of calculus.
- ii. To enlighten the learners in the concept of differential equations and multivariable calculus.
- iii. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

### UNIT -I: Sequences, Series and Mean value theorems:

Sequences and Series: Convergence and divergence – Ratio test – Comparison tests – Integral test – Cauchy's root test – Alternate series – Leibnitz's rule.

Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders.

### UNIT -II: Differential Equations:

Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form Non-homogeneous equations of higher order with constant coefficients with non-homogeneous term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x^n$ ,  $e^{ax} V(x)$  and  $x^n V(x)$  – Method of Variation of parameters- Euler-Cauchy equation and Legendre's equation

Applications: Orthogonal trajectories – Electrical circuits (RL, RC, RLC) – Simple Harmonic motion.

### UNIT III: Partial Differentiation:

Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Jacobian – Functional dependence – Taylor's and Mac Laurin's series expansion of functions of two variables.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

### UNIT IV: Multiple Integrals:

Double integrals – Change of order of integration - Double integrals in polar coordinates- Areas enclosed by plane curves- Triple integrals – Volume of solids – Change of variables to polar, spherical and cylindrical co-ordinates.

Applications: Finding Areas and Volumes.

## **UNIT V: Beta and Gamma Functions:**

Introduction to Improper Integrals-Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

**Course Outcomes:** At the end of the course, the student will be able to

- i. Utilize mean value theorems to real life problems (L3)
- ii. Solve the differential equations related to various engineering fields (L3).
- iii. Familiarize with functions of several variables which are useful in optimization (L3)
- iv. Apply double and triple integration techniques in evaluating areas and volumes bounded by region (L3)
- v. Conclude the use of Beta and Gamma functions in evaluating improper integrals (L4)

### **Text Books:**

1. B. S. Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

### **References:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India.
2. Joel Hass, Christopher Heil and Maurice D. Weir, Thomas calculus, 14<sup>th</sup> Edition, Pearson.
3. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press, 2013.
4. Srmantha Pal, S C Bhunia, Engineering Mathematics, Oxford University Press.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		3	0	0	3

### APPLIED CHEMISTRY

(Common to EEE, ECE, CSE, IT)

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

#### Course Objectives:

- Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- Outline the basics of computational chemistry and molecular switches

#### UNIT-I: POLYMER TECHNOLOGY

**Polymerisation:**-Introduction, methods of polymerization (emulsion and suspension), mechanical properties.

**Plastics:** Compounding, fabrication (compression, injection, blown film and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste (waste to wealth).

**Elastomers:-** Introduction, preparation, properties and applications (Buna S, thiokol and polyurethanes).

**Composite materials:** Fiber reinforced plastics, conducting polymers, biodegradable polymers, biopolymers, biomedical polymers.

#### UNIT -II: ELECTROCHEMICAL CELLS AND CORROSION

Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, construction of glass electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells ( $H_2-O_2$ ,  $CH_3OH-O_2$ , phosphoric acid and molten carbonate).

**Corrosion:-**Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (proper designing and cathodic protection), Protective coatings (surface preparation, cathodic coatings, anodic coatings, electroplating and electroless plating [nickel]), Paints (constituents, functions and special paints).

### **UNIT -III: MATERIAL CHEMISTRY**

**Part I : Non-elemental semiconducting materials:-** Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling, epitaxy, diffusion, ion implantation) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

**Insulators & magnetic materials:** electrical insulators-ferro and ferri magnetism-Hall effect and its applications.

#### **Part II:**

**Nano materials:-** Introduction, sol-gel method, characterization by (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

**Liquid crystals:-** Introduction-types-applications.

**Super conductors:-**Type –I, Type II-characteristics and applications

### **UNIT-IV:SPECTROSCOPIC TECHNIQUES &NON-CONVENTIONAL ENERGY SOURCES**

#### **Part A: SPECTROSCOPIC TECHNIQUES**

Electromagnetic spectrum-UV (laws of absorption, instrumentation, theory of electronic spectroscopy, Frank-condon principle, chromophores and auxochromes, intensity shifts, applications), FT-IR [instrumentation and differentiation of sp, sp<sup>2</sup>, sp<sup>3</sup> and IR stretching of functional groups (alcohols, carbonyls, amines) applications], magnetic resonance imaging and CT scan (procedure & applications).

#### **Part B: NON-CONVENTIONAL ENERGY SOURCES**

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

### **UNIT-V: ADVANCED CONCEPTS/TOPICS IN CHEMISTRY**

**Computational chemistry:** Introduction to computational chemistry, molecular modelling and docking studies and its applications.

**Molecular switches:** characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor

**Course Outcomes:**

At the end of this unit, the students will be able to

- i. Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.
- ii. Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
- iii. Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and Superconductors.
- iv. Analyze the principles of different analytical instruments and their applications. Design models for energy by different natural sources.
- v. Obtain the knowledge of computational chemistry and molecular machines

**Text Books:**

1. P.C. Jain and M. Jain "Engineering Chemistry", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Shikha Agarwal, "Engineering Chemistry", Cambridge University Press, New Delhi, (2019).
3. S.S. Dara, "A Textbook of Engineering Chemistry", S.Chand & Co, (2010).
4. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai Publishing Co. (Latest edition).

**References:**

1. K. Seshamaheshwaramma and Mridula Chugh, "Engineering Chemistry", Pearson India Edn.
2. O.G. Palana, "Engineering Chemistry", Tata McGraw Hill Education Private Limited, (2009).
3. CNR Rao and JM Honig (Eds) "Preparation and characterization of materials" Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, "Textbook of Nanoscience and Nanotechnology", University press (latest edition)





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		3	0	0	3

### PROBLEM SOLVING AND PROGRAMMING USING C

(Common to ALL)

#### Course Objectives:

The objectives of this course is to acquire knowledge on the

- To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.
- To enable effective usage of Control Structures and Implement different operations on arrays.
- To demonstrate the use of Strings and Functions.
- To impart the knowledge of pointers and understand the principles of dynamic memory allocation.
- To understand structures and unions and illustrate the file concepts and its operations.
- To impart the Knowledge Searching and Sorting Techniques.

#### UNIT-I

**Introduction to Computer Problem Solving:** Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem. Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.

#### UNIT-II

**Introduction to C Programming:** Introduction, Structure of a C Program. Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements. Operators, Type Conversion.

**Control Flow, Relational Expressions:** Conditional Branching Statements: if, if-else, if-else—if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement.

#### UNIT-III

**Arrays:** Introduction, Operations on Arrays, Arrays as Function Arguments, Two dimensional Arrays, Multidimensional arrays.

**Pointers:** Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function Arguments, Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command Line Arguments.

## UNIT-IV

**Functions:** Introduction, Function Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes. Recursion.

**Strings:** String Fundamentals, String Processing with and without Library Functions, Pointers and Strings.

## UNIT-V

**Structures, Unions, Bit Fields:** Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type —Enum variables, Using Typedef keyword, Bit Fields.

**Data Files:** Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

### Course Outcomes:

At the end of the Course, Student should be able to:

- i. Illustrate the Fundamental concepts of Computers and basics of computer programming.
- ii. Use Control Structures and Arrays in solving complex problems.
- iii. Develop modular program aspects and Strings fundamentals.
- iv. Demonstrate the ideas of pointers usage.
- v. Solve real world problems using the concept of Structures, Unions and File operations.

### Text Books:

1. How to solve it by Computer, R. G. Dromey, and Pearson Education.
2. Computer Programming. Reema Thareja, Oxford University Press
3. Let us C, Yaswanth Kanetkar, 16th Edition, BPB Publication.

### References:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. Programming In C A-Practical Approach. Ajay Mittal, Pearson.
3. C Programming — A Problem Solving Approach, Forouzan, Gilberg, Cengage.
4. The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
5. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication.

### Web References:

1. <http://www.c4learn.com/>
2. <http://www.geeksforgeeks.org/c/>
3. <http://nptel.ac.in/courses/122104019/>
4. <http://www.learn-c.org/>
5. <https://www.tutorialsyoint.com/cprogramming/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		1	0	4	3
<b>COMPUTER ENGINEERING WORKSHOP</b> (Common to CSE & IT)					

### Course Objectives:

- i. To make the students aware of the basic hardware components of a computer and installation of operating system.
- ii. Demonstrate the techniques of writing algorithms, pseudo codes and schematic flow of logic in software development process.
- iii. To introduce programming through Visual Programming tool using scratch.
- iv. To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools.

### UNIT-I:

#### Introduction to Computers:

Characteristics of Computers, History of Computers, Generations of Computers, Classifications of Computers, Components of Computers, Applications of Computers, Computer Memory, Input and Output devices.

#### Case Studies:

1. Every student should identify the peripherals of a computer, components in a CPU and its functions.
2. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
3. Every student should disassemble and assemble the PC back to working condition.

### UNIT-II:

#### Interaction of User and Computer:

Types of Software, System Software, Application Software, Different Levels of Programming Languages, Compilers, Assemblers, Linkers, Loaders and Interpreter, Internet Access in the Computer, Online Conference tools like Zoom, Google Meet, Go To Meeting

**Case Studies:**

1. Install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.
2. In Hardware Troubleshooting Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.
3. In Software Troubleshooting Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.
4. To create a Resume using MS-Word.
5. To create and analyze student result data using MS-Excel.
6. To create a presentation of your own using MS-PowerPoint.

**UNIT-III:****Problem Solving and Programming:**

Program Development Life Cycle, Algorithm, Flowchart, Pseudo Code, Control Structures, Programming Paradigms, Raptor open-source software

**Case Studies:**

1. Create flowcharts for take-off landing of an Aeroplane.
2. Create a flowchart to validate an email id entered by user.
3. Create flowchart to print first 50 prime numbers.

**UNIT-IV:****Scratch Programming:**

Introduction to Scratch, MotionBlocks , Sound Blocks, Variables, Random Variables, Arithmetic, logical and Relational Operators, Lists, Messages, User Defined Blocks

**Case Studies:**

1. Create an Animation to make a sprite dance for music.
2. Create an Animation that draws a polygon of given number of sides.
3. Create an Animation to draw 20 randomized circles at random positions.
4. Create a music band Animation with multiple instruments.

**UNIT-V:****Network Types and Elements:**

Bus Topology, Star Topology, Ring Topology, Mesh Topology, Hybrid Topology, Local Area Network, Metropolitan Area Networks, Wide Area Networks, Router, Hub, Switch, Repeater, Bridge, Gateway.

**Case Studies:**

1. Finding IP Address and connect to the internet.
2. Identify the best topology of connection in the network.

**Course Outcomes:**

The students should be able to:

- i. Apply knowledge for computer assembling and software installation.
- ii. Understand the difference between system software and application software and that manages the computer resources.
- iii. Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools.
- iv. Create interactive visual programming using scratch.
- v. Identify the type of networks and topologies used in the computer network.

**Textbooks:**

1. Computer Fundamentals, 1 e, Anita Goel, Person Education.
2. Fundamentals of Computers –Reema Thareja-Oxford higher education
3. Scratch Programming for Logic Building, 1e, Kamal Rawat, BPB Publications.
4. Introduction to Information Technology, IITL Education Solutions limited, Pearson Education.

**References:**

1. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
2. [https:// scratch.mit.edu/ideas](https://scratch.mit.edu/ideas)



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		3	0	0	3

### COMMUNICATIVE ENGLISH

(Common to all branches)

#### Course Objectives

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions, and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

#### UNIT-I :A Drawer full of happiness

**Listening:** Listening to short audio texts and identifying the topic. Listening to prose, prose and conversation.

**Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests. Self introductions and introducing others.

**Reading:** Skimming text to get the main idea. Scanning to look for specific pieces of information.

**Reading for Writing:** Paragraph writing (specific topics) using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing - punctuation, capital letters.

**Vocabulary:** Technical vocabulary from across technical branches (20) GRE Vocabulary (20) (Antonyms and Synonyms, Word applications) Verbal reasoning and sequencing of words.

**Grammar:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural basic sentence structures; simple question form - wh-questions; word order in sentences.

**Pronunciation:** Vowels, Consonants, Plural markers and their realizations

## **UNIT-II :Nehru's letter to his daughter Indira on her birthday**

**Listening:** Answering a series of questions about main idea and supporting ideas after listening to audio texts, both in speaking and writing.

**Speaking:** Discussion in pairs/ small groups on specific topics followed by short, structured talks. Functional English: Greetings and leave takings. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

**Reading for Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

**Vocabulary:** Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words) (Antonyms and Synonyms, Word applications)

**Grammar:** Use of articles and zero article; prepositions.

**Pronunciation:** Past tense markers, word stress-di-syllabic words

## **UNIT- III:Stephen Hawking-Positivity 'Benchmark'**

**Listening:** Listening for global comprehension and summarizing what is listened to, both in speaking and writing.

**Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing.

**Reading:** Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Critical reading.

**Reading for Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. Letter writing-types, format and principles of letter writing.E-mail etiquette, Writing CV's.

**Vocabulary:** Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Association, sequencing of words

**Grammar:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

**Pronunciation:** word stress-poly-syllabic words.

## **UNIT- IV: Liking a Tree, Unbowed: Wangari Maathai-biography**

**Listening:** Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts.

**Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, Inviting.

**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

**Reading for Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.Writing SOP, writing for media.

**Vocabulary:** Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Cloze Encounters.

**Grammar:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms, **Pronunciation:** Contrastive Stress

## **UNIT- V: Stay Hungry-Stay foolish**

**Listening:** Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

**Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. Functional English: Suggesting/Opinion giving.

**Reading:** Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques.

**Reading for Writing:** Writing academic proposals- writing research articles: format and style.

**Vocabulary:** Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

**Grammar:** Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

**Pronunciation:** Stress in compound words

### **Course Outcomes:**

At the end of the module, the learners will be able to

- i. Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ii. Ask and answer general questions on familiar topics and introduce oneself/others
- iii. Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- iv. Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- v. Form sentences using proper grammatical structures and correct word forms

### **Text Books:**

1. “Infotech English”, Maruthi Publications. (Detailed)



## References:

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012
5. Martin Hewings , Advanced English Grammar, Cambridge university press
6. William Strunk JR. and E B White, Elements of Style, 4<sup>th</sup>Edition, Pearson
7. Language and Life: A Skills Approach Board of Editors, Orient Black Swan Publishers, India. 2018.
8. Practical English Usage, Michael Swan. OUP. 1995.
9. Remedial English Grammar, F.T. Wood. Macmillan.2007
10. On Writing Well, William Zinsser. Harper Resource Book. 2001
11. Study Writing, Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
12. Communication Skills, Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
13. Exercises in Spoken English, Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
14. Advanced English Grammar, Martin Hewings. Cambridge University Press. 2016
15. Elements of Style, William Strunk and EB White. Pearson. 1999.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		0	0	3	1.5

**ENGLISH COMMUNICATION SKILLS LAB**  
(Common to all branches)

### Course Objectives

- To impart grammar as well as communication through pronunciation. By introduction, pure vowels, consonants, diphthongs, phonetic transcription, common errors in pronunciation.
- To impart better knowledge on Stress. Stress of kinds- mono syllabic, di syllabic, poly syllabic, strong and weak forms of stress along with contrastive stress.
- To impart learner grammar as well as communication through compound words, rhythm, intonation and accent neutralization
- To impart learner grammar as well as communication through listening, by identifying the context and specific pieces of information to answer a series of questions in speaking
- To improve the spoken skills of students by making them read news papers in order to understand and identify key terms context they read .

### UNIT- I:

Vowels, Consonants, Pronunciation, Phonetic Transcription, Common Errors in Pronunciation,

### UNIT- II:

Word stress-di-syllabic words, poly-syllabic words, weak and strong forms, contrastive stress (Homographs)

### UNIT- III:

Stress in compound words, rhythm, intonation, accent neutralisation.

### UNIT- IV:

Listening to short audio texts and identifying the context and specific pieces of information to answer a series of questions in speaking.

### UNIT - V:

Newspapers reading; Understanding and identifying key terms and structures useful for writing reports.

## **Course Outcomes:**

At the end of the module, the learners will be able to

- i. The learner will improve phonetic understanding, transcription, common errors both in pronunciation and written English.
- ii. The learner will improve syllabic division, and how to use right stress in their pronunciation.
- iii. The learner will improve speaking skills with right intonation and rhythm and intonation and how to reduce mother tongue influence in English.
- iv. The learner will Improve speaking skills as well as listening skills by listening through the audio clips prescribed.
- v. The learner will Improve speaking skills along with reading skills.

## **Text Books:**

1. “InfoTech English”, Maruthi Publications.

## **References:**

1. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
2. English Pronunciation in use- Mark Hancock, Cambridge University Press.
3. English Phonetics and Phonology-Peter Roach, Cambridge University Press.
4. English Pronunciation in use- Mark Hewings, Cambridge University Press.
5. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
6. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		0	0	3	1.5
<b>APPLIED CHEMISTRY LAB</b> (Common to EEE, ECE, CSE, IT)					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- i. Normality, molarity, theory of indicators used in different volumetric and chemical analysis.
- ii. Alkalinity and hardness of water by EDTA method.
- iii. Volumetric analysis-Red-Ox titrations of different chemical compounds.
- iv. Determination of concentration of acids and bases using conductometer and potentiometer
- v. Determination of  $P^H$  and colorimetric analysis

Introduction to Chemistry laboratory – Molarities, normality, primary, secondary standard solutions, Volumetric titrations, quantitative analysis

1. Determination of HCl using standard  $Na_2CO_3$  solution.
2. Determination of alkalinity of a sample containing  $Na_2CO_3$  and NaOH.
3. Determination of  $Mn^{+2}$  using standard oxalic acid solution.
4. Determination of ferrous iron using standard  $K_2Cr_2O_7$  solution.
5. Determination of  $Cu^{+2}$  using standard hypo solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of  $Fe^{+3}$  by a colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
9. Determination of iso-electric point of amino acids using pH-metry method/conductometric method.
10. Determination of the concentration of strong acid vs strong base (by conductometric method).
11. Determination of strong acid vs strong base (by potentiometric method).
12. Determination of  $Mg^{+2}$  present in an antacid.
13. Determination of  $CaCO_3$  present in an egg shell.
14. Estimation of Vitamin C.
15. Determination of phosphoric content in soft drinks.
16. Adsorption of acetic acid by charcoal.
17. Preparation of nylon-6, 6 and Bakelite (demonstration only).
18. Determination of Lead in drinking water.
19. Determination of percentage of copper in Brass.

Of the above experiments at-least 10 assessment experiments should be completed in a semester.

**Course Outcomes:**

- i. Student is exposed to volumetric titrations acquires some volumetric skills.
- ii. Student is able to analyze hard and soft water.
- iii. Student is exposed to volumetric skills of red-ox titrations with different indicators
- iv. Students can handle the instruments like conduct meter, potentiometer in determining the concentrations of acids and bases.
- v. Student is able to analyze the different chemical concentrations using colorimeter and P<sup>H</sup> meter.

**References:**

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co. Latest edition



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		0	0	3	1.5

### PROBLEM SOLVING AND PROGRAMMING USING C LAB

(Common to ALL)

#### Course Objectives:

The objectives of this course is to acquire knowledge on the

- i. To impart knowledge on basic Linux commands, various Editors, Raptor.
- ii. To make the students understand the concepts of C programming.
- iii. To nurture the students on Control Structures and develop different operations on arrays.
- iv. To make use of String fundamentals and modular programming constructs.
- v. To implement programs using dynamic memory allocation.
- vi. To explain the concepts of Structure, Unions and files for solving various problems.

#### List of Experiments:

##### 1. Introduction to Algorithms and Flowcharts

- 1.1) Implement Algorithm Development for Exchange the values of Two numbers.
- 1.2) Given a set of n student's examination marks (in the range 0-100) make a count of the number of students that passed the examination. A Pass is awarded for all of 50 and above.
- 1.3) Given a set of n numbers design an algorithm that adds these numbers and returns the resultant sum. Assume N is greater than or equal to zero.

##### 2. Introduction to C Programming

- 2.1) Basic Linux Commands.
- 2.2) Exposure to TurboC, Vi, Emacs, CodeBlocks IDE, DevC++.
- 2.3) Writing simple programs using printf(), scanf().

##### 3. Raptor

- 3.1) Installation and Introduction to Raptor.
- 3.2) Draw a flow chart to find the Sum of 2 numbers.
- 3.3) Draw a flow chart to find Simple interest.

#### **4. BasicMath**

- 4.1) Write a C Program to convert Celsius to Fahrenheit and vice versa.
- 4.2) Write a C Program to find largest of three numbers using ternary operator.
- 4.3) Write a C Program to Calculate area of a Triangle using Heron's formula.

#### **5. ControlFlow-I**

- 5.1) Write a C Program to Find Whether the Given Year is a Leap Year or not.
- 5.2) Write a C program to find the roots of a Quadratic Equation.
- 5.3) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using Switch...case.

#### **6. ControlFlow-II**

- 6.1) Write a C Program to Find Whether the Given Number is Prime number or not.
- 6.2) Write a C Program to Find Whether the Given Number is Armstrong Number or not.
- 6.3) Write a C program to print Floyd Triangle.

#### **7. ControlFlow-III**

- 7.1) Write a C program to find the sum of individual digits of a positive integer.
- 7.2) Write a C program to check whether given number is palindrome or not.
- 7.3) Write a C program to read two numbers, x and n, and then compute the sum of the geometric progression  $1+x+x^2+x^3+\dots+x^n$ .

#### **8. Arrays**

- 8.1) Write a C program to search an element in the given array (Linear Search).
- 8.2) Write a C program to perform matrix addition.
- 8.3) Write a C program to perform matrix multiplication.

#### **9. Pointers**

- 9.1) Write a C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers using Command line arguments.
- 9.2) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
- 9.3) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

#### **10. Functions, Array & Pointers**

- 10.1) Write a C Program to demonstrate parameter passing in Functions.
- 10.2) Write a C Program to find Fibonacci, Factorial of a number with recursion and without recursion.
- 10.3) Write a C Program to find the sum of given numbers with arrays and pointers.

## 11. Strings

11.1) Implementation of string manipulation operations with library function:

1. copy
2. concatenate
3. length
4. compare

11.2) Implementation of string manipulation operations without library function:

- a. copy
- b. concatenate
- c. length
- d. compare

## 12. Structures

12.1) Write a C Program to Store Information of a book Using Structure.

12.2) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function.

## 13. Files

13.1) Write a C program to open a file and to print the contents of the file on screen.

13.2) Write a C program to copy content of one file to another file.

13.3) Write a C program to merge two files and store content in another file.

## 14. Application

Creating structures to capture the student's details save them in file in proper record format. search and prints the student details requested by the user.

**Note: Draw the flowcharts using Raptor from Experiment 3 to Experiment 6.**

### Course Outcomes:

- i. Implement basic programs in C and design flowcharts in Raptor.
- ii. Use Conditional and Iterative statements to solve real time scenarios in C.
- iii. Implement the concept of Arrays and Modularity and Strings.
- iv. Apply the Dynamic Memory Allocation functions using pointers.
- v. Develop programs using structures, and Files.

### Text Books:

1. Let us C, Yaswanth Kanetkar, 16th Edition, BPB Publication.
2. How to solve it by Computer, R. G. Dromey, and Pearson Education.
3. Computer Programming. Reema Thareja, Oxford University Press



**References:**

1. Programming in C A-Practical Approach Ajay Mittal. Pearson Education.
2. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
3. Problem solving using C , K Venugopal,3'd Edition,TMG Publication.

**Web References:**

1. <https://www.hackerrank.com/>
2. <https://www.codechef.com/>
3. <https://www.topcoder.com/>
4. <https://code-cracker.github.io/>
5. <https://raptor.martincarlisle.com/>
6. <https://nptel.ac.in/courses/106105055/2>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-I Semester		L	T	P	C
		2	0	0	0

### ENVIRONMENTAL SCIENCE

(Common to ALL)

#### Course Objectives:

The objectives of this course is to acquire knowledge on the

- The natural resources and their sustenance of the life and recognize the need to conserve the natural resources.
- The concepts of ecosystem and its functions in the environment. The need for protecting the producers and consumers and their role in the food web.
- The biodiversity of India and the threats to biodiversity, and the conservation practices to protect the biodiversity.
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management.
- Social issues both rural and urban environment and the possible means to combat the challenges.

#### UNIT - I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance - Need for public Awareness.

Natural Resources : Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over - exploitation, deforestation, - Timber extraction - Mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water -dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

#### UNIT - II: ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the ecosystems.

Biodiversity and its Conservation : Definition: genetic, species and ecosystem diversity – Bio geographical classification of India - Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels - India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### **UNIT - III Environmental Pollution and solid waste Management**

Environmental pollution: Definition, Cause, effects and control measures of: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, nuclear hazards.

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes -Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.

### **UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT**

Social Issues and the Environment: From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions - Climate change, global warming, acid rain and ozone layer depletion, Wasteland reclamation – Consumerism and waste products. - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. -Water (prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act.

### **UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT**

Human population and the Environment: Population growth, variation among nations' Population explosion - Family Welfare programme. - Environment and human health - Human Rights - Value Education - HIV/AIDS - Women and Child Welfare - Role of information Technology in Environment and human health.

Field Work: Visit to a local area to document environmental assets River/forest

Grassland/hill/mountain - Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds - river, hill slopes.

### **Course Outcomes:**

The students should be able to:

- i. Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
- ii. Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities.
- iii. Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century.
- iv. Influence their society in proper utilization of goods and services, Recognize the interconnectedness of human dependence on the earth's ecosystems.
- v. Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices.

**Text Books:**

1. Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy - Pearson education.
3. Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company.

**References:**

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering - J. Glynn Henry and Gary W. Heinke – Prentice hall India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House.
6. Introduction to Environmental engineering and science by Gilberl M. Masters and Wendell P.Ela - Prentice hall of India Private limited.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-II Semester		L	T	P	C
		3	0	0	3
<b>LINEAR ALGEBRA AND NUMERICAL METHODS</b>					

(Common to all branches)

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- i. To instruct the concept of Matrices in solving linear algebraic equations
- ii. To elucidate the different numerical methods to solve nonlinear algebraic equations
- iii. To disseminate the use of different numerical techniques for carrying out numerical integration.
- iv. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

### UNIT – I: Systems of linear equations, Eigen values and Eigen vectors:

Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss Elimination method – Eigenvalues and Eigen vectors and their properties.

Applications: Free vibration of a two-mass system.

### UNIT – II: Cayley-Hamilton theorem and Quadratic forms:

Cayley-Hamilton theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton theorem –Reduction to Diagonal form– Quadratic forms and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation.Singular values of a matrix, singular value decomposition (Ref. Book – 1).

### UNIT – III: Iterative methods:

Introduction– Solutions of algebraic and transcendental equations: Bisection method–Secant method – Method of false position– Iteration method – Newton-Raphson method (One variable and simultaneous Equations) Solutions of system of equations - Jacobi and Gauss-Seidel methods Evaluation of largest eigenvalue –eigenvector using Power Method.

### UNIT – IV: Interpolation:

Introduction - Errors in polynomial interpolation – Finite differences– Forward differences– Backward differences –Central differences – Relations between operators – Newton’s forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange’s interpolation formula– Newton’s divide difference formula.

## **UNIT–V:Numerical integration and solution of differential equations with initial conditions**

Trapezoidal rule– Simpson's  $1/3^{\text{rd}}$  and  $3/8^{\text{th}}$  rule– Solution of differential equations with initial conditions by Taylor's series– Picard's method of successive approximations– Euler's method – Runge-Kutta method (second and fourth order) – Milne's Predictor and Corrector Method.

**Course Outcomes:** The student will be able to

- i. Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- ii. Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
- iii. Evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)
- iv. Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
- v. Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)

### **Text Books:**

1. B. S. Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

### **References:**

1. David Poole, Linear Algebra- A modern introduction, 4<sup>th</sup> Edition, Cengage.
2. Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
3. M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
4. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year- II Semester		L	T	P	C
		3	0	0	3

**APPLIED PHYSICS**  
(Common to CSE, ECE, EEE & IT)

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- Understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications, study of propagation of light through optical fibers and their implications in optical communications.
- Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of deBroglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals and band theory for crystalline solids. Metals-Semiconductors-Insulators concepts utilization of transport phenomenon of charge carriers in semiconductors.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
- To understand the physics of Semiconductors and their working mechanism. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

### UNIT - I: Wave Optics

**Interference:** Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton’s Rings- Determination of wavelength and refractive index.

**Diffraction:** Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits (Qualitative) – Diffraction Grating - resolving power of Grating(Qualitative).

**Polarization:** Introduction-Types of polarization - Polarization by reflection and Double refraction - Nicol’s Prism -Half wave and Quarter wave plates.

### UNIT - II: Lasers and Fiber optics

**Lasers:** Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein’s coefficients and their relation – Population inversion – Lasing action - Pumping mechanisms – Ruby laser – He-Ne laser-Semiconductor laser - Applications of lasers.

**Fiber optics:** Introduction –Principle of optical fiber- Acceptance Angle - Numerical Aperture - Classification of optical fibers based on refractive index profile and modes –Block diagram of fiber optic communication.

### **UNIT - III: Quantum Mechanics, Free Electron Theory and Band theory**

**Quantum Mechanics:** Dual nature of matter – Heisenberg’s Uncertainty Principle – Significance and properties of wave function – Schrodinger’s time independent and dependent wave equations– Particle in a one-dimensional infinite potential well-Quantum tunnelling effect (qualitative).

**Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Fermi energy-Equation for electrical conductivity based on quantum free electron theory –Fermi-Dirac distribution.

### **UNIT - IV: Dielectric and Magnetic Materials**

**Dielectric Materials:** Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius-Mossotti equation.

**Magnetic Materials:** Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Origin of permanent magnetic moment - Classification of magnetic materials: Dia, para, Ferro, antiferro&Ferri magnetic materials - Domain concept for Ferromagnetism (Qualitative) - Hysteresis - soft and hard magnetic materials-Applications.

### **UNIT - V: Semiconductors and Superconductors**

**Semiconductors:** Introduction-Classification of solids - Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – extrinsic semiconductors – density of charge carriers –Drift and diffusion currents – Einstein’s equation- Hall effect – Hall coefficient – Applications of Hall effect.

**Superconductors:** Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory (Qualitative) – Josephson effects (AC and DC) – SQUIDs.

### **Course Outcomes:**

The students should be able to:

- i. Understand the concepts of physical optics through the wave nature of light and discuss the phenomenal differences between interference, diffraction and polarization.
- ii. Describe the basic laser physics, working of lasers, and principle of propagation of light in optical fibers.
- iii. Apply the knowledge of basic quantum mechanics, to set up onedimensional Schrodinger’s wave equation and summarize the importance of free electrons in determining the properties of metals.
- iv. Explain the basics of dielectric and magnetic materials to synthesize new materials as per needs of engineering applications.
- v. gainthe knowledge of semiconductor bonding, semiconductor carrier properties and phenomenological describe the phenomenon of superconduction



**Text Books:**

1. M. N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy” A Text book of Engineering Physics”-  
S.Chand Publications, 11th Edition 2019.
2. Engineering Physics” by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
3. Applied Physics by P.K.Palanisamy SciTech publications.

**References:**

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons
2. Engineering Physics by M.R.Srinivasan, New Age international publishers (2009).
4. Shatendra Sharma, Jyotsna Sharma, “ Engineering Physics”, Pearson Education, 2018
5. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press
6. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill
7. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-II Semester		L	T	P	C
		3	0	0	3
<b>DIGITAL LOGIC DESIGN</b>					

### Course Objectives:

- i. To introduce the basic tools for design with combinational and sequential digital logic and state machines.
- ii. To learn simple digital circuits in preparation for computer engineering.

### UNIT- I:

#### Digital Systems and Binary Numbers:

Digital Systems, Binary Numbers, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction.

### UNIT -II:

#### Concept of Boolean algebra:

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and StandardForms, Minterms and Maxterms.

### UNIT- III:

#### Gate level Minimization:

Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, Realisation of logic gates using universal gates, Exclusive-OR Function.

#### Combinational Logic:

Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits.

### UNIT- IV:

#### Synchronous Sequential Logic:

Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked Sequential Circuits, Mealy and Moore Models of Finite State Machines.

### UNIT -V:

#### Registers and Counters:

Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, JohnsonCounter, Ripple Counter.

**Course Outcomes:**

A student who successfully fulfils the course requirements will have demonstrated:

- i. An ability to define different number systems, binary addition and subtraction, 2's Complement representation and operations with this representation.
- ii. An ability to understand the different switching algebra theorems and apply them for logic functions.
- iii. An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
- iv. An ability to design and analyze Sequential logic circuits.
- v. An ability to design basic combinational circuits and verify their functionalities.

**Text Books:**

1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

**References:**

1. Digital Logic and Computer Design, M.Morris Mano, PEA.
2. Digital Logic Design, Leach, Malvino, Saha, TMH.
3. Modern Digital Electronics, R.P. Jain, TMH.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-II Semester		L	T	P	C
		3	0	0	3

**DATA STRUCTURES THROUGH C++**

### Course Objectives:

- i. To enable the students to learn the common concepts of C& C++.
- ii. To illustrate the object-oriented principles and their implementation in C++.
- iii. To impart the knowledge on classes, objects, member functions, constructors, destructors and how to overload functions and operators in C++.
- iv. To make the students learn applications of inheritance.
- v. To facilitate the students to write various programs using virtual functions and Polymorphism.
- vi. To demonstrate Generic Programming with Templates.
- vii. To Understand the Concepts of Data Structures.
- viii. To make the students learn implementation of linear data structures using linked lists.

### UNIT- I:

#### An Overview of C++:

Difference between C and C++, The Origin of C++, Key Concepts of Object Oriented Programming, A Sample C++ Program.

#### Classes and Objects:

Classes, Declaring Objects, Access labels and their Scope, Defining Member Functions, Friend functions, Inline Functions, Static Member Variable, Static Member Function, Constructors and Destructors, Scope Resolution Operator, Nested class.

### UNIT-II:

#### Function Overloading:

Function Overloading, Constructor Overloading, Constructor with Arguments, Copy Constructor, Default Function Arguments.

#### Operator Overloading:

Creating a Member Operator Function, Operator Overloading using Friend function, overloading new and delete.

### UNIT -III:

#### Inheritance and Polymorphism:

Inheritance, Types of Inheritance, access labels & simple inheritance, protected data with private inheritance, Virtual Base Classes Polymorphisms, Virtual Functions, Rules for Virtual Function, Pure Virtual Functions, and Early Vs Late Binding.

## **Templates and Exception Handling:**

Templates: Generic Functions, Applying Generic Functions, Generic Classes, Difference between Templates and Macros, An overview of STL, Container classes, Exception handling-Exception Handling fundamentals ( try, catch, throw), applying exception handling.

## **UNIT-IV**

### **Introduction to Data structures:**

Data structures, Types of data structures, List ADT, Single linked lists and chains, representing chains in C++, Linked stacks and queues, doubly linked list, circular lists and Applications of Lists.

## **UNIT V**

### **Stacks and Queues:**

Stack ADT- array representation, Linked list representation, Applications of stacks, Evaluation of expressions, Queue ADT-array representation, Variants of queues, applications of queues.

### **Course Outcomes:**

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

- i. Compare and contrast object-oriented programming and procedural oriented Programming.
- ii. Make use of constructor and destructor to initialize and destroy class objects.
- iii. Develop programs using function overloading & operator overloading.
- iv. Apply inheritance to build real time applications
- v. Make use of virtual functions to implement runtime polymorphism.
- vi. Apply Exception handling mechanism to handle runtime errors.
- vii. Design stacks and queues using linked list.

### **Text Books:**

1. The C++ Programming Language-Fourth Edition, Bjarne Stroustrup, Addison-Wesley.
2. Data Structures and algorithm analysis in C++, 2nd ed, Mark Allen Weiss.
3. Fundamentals of data structures in C++, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta.

### **References:**

1. Object oriented programming in C++, Joyce Farrell, Cengage.
2. The Complete Reference C++, Herbert Schildt, TMH, Fourth Edition, 2003
3. Data structures and algorithms in C++, 3<sup>rd</sup> edition, Adam Drozdek, Thompson.

### **Web References:**

1. <http://www.studytonight.com/data-structures/>
2. <http://nptel.ac.in/courses/106102064/>
3. <http://www.geeksforgeeks.org/data-structures/>
4. [https://www.tutorialspoint.com/cplusplus/cpp\\_object\\_oriented.html/](https://www.tutorialspoint.com/cplusplus/cpp_object_oriented.html/)
5. <https://www.javatpoint.com/cpp-oops-concepts/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-II Semester		L	T	P	C
		3	0	0	3
<b>LINUX AND SYSTEM ADMINISTRATION</b>					

### Course Objectives:

- i. Understanding Fundamentals of Linux Systems and File Structure
- ii. Understanding Desktop
- iii. Understanding Basic System Administration
- iv. Managing Users and File Systems
- v. Understanding Linux Troubleshooting

### UNIT - I

#### The Linux Shell and File Structure

**Fundamentals of UNIX & Linux Systems:** History of UNIX & Linux, comparison of distributions, installation, navigation of the file system, the command line interface, piping, standard input/output redirection, basic text editors and common tools

#### Linux Files and Directories:

The File Structure, Listing, Displaying, and Printing Files, Managing Directories, File and Directory Operations

### UNIT - II

#### Desktop:

**The X Window system, Xorg, GNOME, KDE:** The X Protocol, Xorg, X Window System Command Line Arguments, GNOME 2.x features, GNOME Interface, GNOME Desktop, Configuration and Administration Access with KDE, KDE Desktop

### UNIT – III

#### Basic System Administration:

Superuser Control, System Time and Date, Scheduling Tasks, System Runlevels, System Directories

### UNIT – IV

#### Managing Users:

Add/modify/remove users & groups, modify UNIX permissions, set password & account policies, create access controls, monitor account activity, and set resource limits, Controlling Access to Directories and Files

#### File Systems:

File Systems, File System Hierarchy Standard (FHS), Creating File Systems: mkfs, mke2fs, mkswap parted. and fdisk.

## **UNIT – V**

### **Understanding Linux Troubleshooting**

Troubleshooting Methodology, Troubleshooting Tools, Rescue Environments

#### **Course Outcomes:**

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

- i. Carry the duties of a Linux system administrator.
- ii. learn to do file processing, process management, IO management, queues management, account management,
- iii. Proper system start-up and shutting down, as well as other tasks.

#### **Text Books:**

1. Linux: The Complete Reference, Sixth Edition, Richard Peterson
2. Linux System Administration by Paul Cobbaut
3. The Linux System Administrator's Guide by Lars Wirzenius, Joanna Oja, Stephen Stafford

#### **References:**

1. Maurice J. Bach, "Design of the Unix Operating System" , Pearson Education,2008
2. SumitabhaDas , "Unix : Concept and Applications" , Tata McGraw-Hill,2008
3. ISRD Group, "Basics of OS , UNIX and Shell programming" , Tata McGraw-Hill,2006.
4. Sarwar, Koretsky , and Sarwar, "Unix,The Text Book" Pearson Education,2007

#### **Supplementary Reading:**

1. Stephen Prata "Advanced Unix-A programmer's Guide" . BPB publication, 2008
2. Kochan S & Wood P , "Unix Shell programming" , Pearson Education, 2008
3. Stevens W R Rago S.A, "Advanced Programming in Unix Environment" Pearson Education,2008



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-II Semester		L	T	P	C
		0	0	3	1.5
<b>DIGITAL LOGIC DESIGN LAB</b>					

### Course Objectives:

The objectives of this course are to:

- i. Introduce the concept of digital and binary systems.
- ii. To know the concepts of Combinational circuits.
- iii. Be able to design and analyze Sequential logic circuits.
- iv. To understand the concepts of flip-flops, registers and counters.
- v. Students will learn and understand the basics of logic gates and circuits.

### List of Experiments:

1. Verification of Basic Logic Gates.
2. Implementing all individual gates with Universal Gates NAND & NOR.
3. Design a circuit for the given Canonical form, draw the circuit diagram and verify the De-Morgan laws.
4. Design a Combinational Logic circuit for 8x1 MUX and verify the truth table.
5. Verify the data read and data write operations for the IC 74189.
6. Construct Half Adder and Full Adder using Half Adder and verify the truth table.
7. Design a 4-bit Adder/Subtractor.
8. Design and realization of 4-bit comparator.
9. Design and implement a 3 to 8 decoder using gates.
10. Design and realization of a 4-bit Gray to Binary and Binary to Gray converter.
11. Implementation of Master Slave Flip-Flop with J-K Flip- Flop and verify the truth table for ace around condition.
12. Design a Decade Counter and verify the truth table.
13. Design and implement a 4-bit shift register using Flip flops.
14. Design and Verify the 4-bit synchronous.
15. Design and verify 4-bit ripple counter (Asynchronous).



**Course Outcomes:**

- i. A student who successfully fulfils the course requirements will have demonstrated:
- ii. To learn about the basics of gates.
- iii. To understand, analyze and design the basic digital circuits and any digital design in
- iv. real time applications.
- v. Construct basic combinational circuits and verify their functionalities.
- vi. Apply the design procedures to design basic sequential circuits.
- vii. An ability to measure and record the experimental data, analyse the results, and prepare a formal laboratory report.

**Text Books:**

1. Digital Design ,4/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.
3. Digital Logic Design, Leach, Malvino, Saha, TMH.

**References:**

1. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
2. Verilog HDL primer, Jaya Bhaskar, PEA.
3. Modern Digital Electronics, R.P. Jain, TMH.
4. Digital Fundamentals, Thomas L. Floyd, Pearson Education, ISBN:9788131734483.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-II Semester		L	T	P	C
		0	0	3	1.5

**APPLIED PHYSICS LAB**  
(Common to CSE, ECE, EEE & IT)

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- To impart skills in measurements with accurate error propagation.
- To plan the experimental procedure, design and to record and analysis results.
- To reach non-trivial conclusions of significant of the experiments.
- To develop the skills to handle different instruments without taking erroneous readings and ability to enhance the skills to fabricate engineering and technical equipments.

### List of Experiments:

- Determination of thickness of thin object by wedge method.
- Determination of radius of curvature of a given plano convex lens by Newton's rings.
- Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
- V-I Characteristics of a P-N Junction diode.
- Determination of dielectric constant for different materials.
- Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
- Determination of numerical aperture and acceptance angle of an optical fiber.
- Determination of wavelength of Laser light using diffraction grating.
- Estimation of Planck's constant using reverse photoelectric effect.
- V-I Characteristics of a zener diode.
- To determine the energy gap of a semiconductor using p-n junction diode.
- Magnetic field along the axis of a current carrying circular coil by Stewart & Gee's Method.
- Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.
- Measurement of resistance of a semiconductor with varying temperature.
- Resistivity of a Superconductor using four probe method & Meissner effect.

**Course Outcomes:**

The students should be able to:

- i. Describe the methodology of science and the relationship between observation and theory.
- ii. Develop scientific problem-solving skills, including organization of given information, identification and application of pertinent principles, quantitative solutions, interpreting results, and evaluating the validity of results.
- iii. Discover of physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry.
- iv. Learn to minimize contributing variables and recognize the limitations of equipment.
- v. Apply conceptual understanding of the physics to general real-world situations.
- vi. Develop interpersonal and communication skills including communicating in small groups, writing, working effectively with peers.

**References:**

1. S. Balasubramanian, M.N. Srinivasan "A Text Book of Practical Physics"- S Chand Publishers, 2017.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

I Year-II Semester		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>
<b>DATA STRUCTURES THROUGH C++ LAB</b>					

### Course Objectives:

- i. To strengthen their problem-solving ability by applying the characteristics of an object-oriented approach.
- ii. To introduce object oriented concepts in C++ .
- iii. To develop skills to design and analyze simple linear data structures.
- iv. To Strengthen the ability to identify and apply the suitable data structure for the given real-world problem.
- v. To Gain knowledge in practical applications of data structures.

### List of Experiments:

#### Exercise – 1(Basics & Expressions Control Flow)

- a) Write a Simple Program on printing “Hello World” and “Hello Name” where name is the input from the user.
- b) Write a Program that computes the simple interest and compound interest payable on principal amount (in Rs.) of loan borrowed by the customer from a bank for a given period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.
- c) Write a Program to calculate the fare for the passengers traveling in a bus. When a Passenger enters the bus, the conductor asks “What distance will you travel?” On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

#### Exercise – 2 (Variables, Scope, Allocation)

- a) Write a program to implement call by value and call by reference using reference variable.
- b) Write a program to illustrate scope resolution, new and delete Operators. (Dynamic Memory Allocation)
- c) Write a program to illustrate Storage classes d) Write a program to illustrate Enumerations.

#### Exercises –3 (Functions)

- a) Write a program illustrating Inline Functions
- b) Write a program illustrates function overloading. Write 2 overloading functions for power.
- c) Write a program illustrates the use of default arguments for simple interest function.

**Exercise -4 (Functions –Exercise Continued)**

- a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers
- b) Write a program illustrate function template for power of a number.
- c) Write a program to illustrate function template for swapping of two numbers.

**Exercise -5 (Classes Objects)**

Create a Distance class with:

- feet and inches as data members
- member function to input distance
- member function to output distance
- member function to add two distance objects

- a) Write the main function to create objects of DISTANCE class. Input two distances and output the sum.
- b) Write a C++ Program to illustrate the use of Constructors and Destructors (use the above program.)
- c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem).

**Exercise -6(Access)**

- a) Write a program for illustrating access labels public, private, protected.
- b) Write a program implementing Friend Function.
- c) Write a program to illustrate this pointer.
- d) Write a Program to illustrate pointer to a class.

**Exercise -7(Templates)**

- a) Write a C++ Program to illustrate template class.
- b) Write a Program to illustrate class templates with multiple parameters.
- c) Write a Program to illustrate member function templates.

**Exercise -8 (Operator Overloading)**

- a) Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function. i. Unary operator as member function ii. Binary operator as nonmember function
- b) Write a c ++ program to implement the overloading assignment = operator.

**Exercise -9 (Inheritance)**

- a) Write C++ Programs and incorporating various forms of Inheritance i) Single Inheritance ii) Hierarchical Inheritance iii) Multiple Inheritances iv) Multi-level inheritance v) Hybrid inheritance
- b) Write a program to show Virtual Base Class.

**Exercise-10 (Inheritance –Continued)**

- a) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance.
- b) Write a Program to show how constructors are invoked in derived class.

**Exercise -11 (Polymorphism)**

- a) Write a program to illustrate runtime polymorphism
- b) Write a program to illustrate this pointer
- c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.

**Exercise -12(Templates)**

- a) Write a C++ Program to illustrate template class
- b) Write a Program to illustrate class templates with multiple parameters
- c) Write a Program to illustrate member function templates.

**Exercise -13 (Exception Handling)**

- a) Write a Program for Exception Handling Divide by zero.
- b) Write a Program to rethrow an Exception.

**Exercise -14 (STL)**

- a) Write a Program to implement List and List Operations.
- b) Write a Program to implement Vector and Vector Operations.

**Exercise -15 (STL Continued)**

- a) Write a Program to implement Deque and Deque Operations.
- b) Write a Program to implement Map and Map Operations.

**Exercise-16(Data Structures)**

- a) Implementation of Single linked list.
- b) Implementation of Doubly linked list.

**Exercise-17(Data Structures contd...)**

- a) Implementation of stacks using Arrays and Linked lists.
- b) Implementation of any two stack applications using C++.

**Course Outcomes:**

- i. Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
- ii. Apply an object-oriented approach to developing applications of varying complexities
- iii. Be able to design and analyze the time and space efficiency of the primitive data structure.
- iv. Be capable to identify the appropriate data structure for the given problem.
- v. Have practical knowledge on the application of data structures.

**Text Books:**

1. The C++ Programming Language-Fourth Edition,BjarneStroustrup,Addison-Wesley.
2. Data Structures and algorithm analysis in C++, 2nded, Mark Allen Weiss.
3. Fundamentals of data structures in C++,EllisHorowitz,SartajSahni,Dinesh Mehta.

**References:**

1. Object oriented programming in C++, Joycee Farrell, Cengage.
2. The Complete Reference C++, Herbert Schildt, TMH, Fourth Edition, 2003
3. Data structures and algorithms in C++,3<sup>rd</sup> edition, Adam Drozdek, Thompson.

**Web References:**

1. <http://www.studytonight.com/data-structures/>
2. <http://nptel.ac.in/courses/106102064/>
- 3.<http://www.geeksforgeeks.org/data-structures/>
4. [https://www.tutorialspoint.com/cplusplus/cpp\\_object\\_oriented.html/](https://www.tutorialspoint.com/cplusplus/cpp_object_oriented.html/)
5. <https://www.javatpoint.com/cpp-oops-concepts/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester		L	T	P	C
		3	0	0	3
DISCRETE MATHEMATICAL STRUCTURES					

### Course Objectives:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

### UNIT -I: Mathematical Logic

**Propositional Calculus:** Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, and Equivalence of Formulas, Duality Law, Tautological Implications, and Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises and Indirect Method of Proof.

**Predicate Calculus:** Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

### UNIT -II: Functions & Relations

**Set Theory:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams,

**Functions:** Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties

### UNIT- III: Algebraic Structures and Number Theory

**Algebraic Structures:** Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism

**Number Theory:** Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

#### **UNIT -IV: Recurrence Relations**

Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

#### **UNIT -V: Graph Theory**

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs)

#### **Course Outcomes:**

The student will be able to

- i. Demonstrates skills in solving mathematical problems using principles of logic.
- ii. Apply the set theory principles in solving the mathematical problems in computer science.
- iii. Know the mathematical principles in solving the network problems.
- iv. Communicate effectively mathematical principles using recurrence relations.
- v. Analyze data graphically using mathematical knowledge

#### **Text Books:**

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGrawHill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and
3. D. P. Mohapatra, 3<sup>rd</sup> Edition, Tata McGraw Hill.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7<sup>th</sup> Edition, Tata McGrawHill.

#### **References:**

1. Discrete Mathematics for Computer Scientists and Mathematicians, J.L. Mott, A. Kandel, T. P. Baker, 2<sup>nd</sup> Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborty and B.K. Sarkar, Oxford, 2011





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester		L	T	P	C
		3	0	0	3
<b>JAVA PROGRAMMING</b>					

### Course Objectives:

- i. Implementing programs for user interface and application development using core java principles.
- ii. Focus on object-oriented concepts and java program structure and its installation.
- iii. Comprehension of java programming constructs, control structures in Java Programming Constructs.
- iv. Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
- v. Understanding of Thread concepts and I/O in Java.
- vi. Being able to build dynamic user interfaces using applets and Event handling in java.
- vii. Understanding of Various Components of Java AWT and Swing and write Code Snippets using them.

### UNIT I:

#### Introduction to OOP

Introduction, Need of Object-Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program Structures, Installation of JDK1.6.

### UNIT II:

Variables, Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals, Operators- Binary, Unary and Ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of Control-Branching, Conditional Loops.

**Classes and Objects-** Classes, Objects, Creating Objects, Methods, Constructors-Constructor Overloading, Cleaning up Unused Objects-Garbage Collector, Class Variable and Methods-Static Keyword, this keyword, Arrays, Command Line Arguments.

### UNIT III:

**Inheritance:** Types of Inheritance, Deriving Classes using Extends Keyword, Method Overloading, Super Keyword, Final Keyword, Abstract Class.

**Interfaces, Packages and Enumeration:** Interface-Extending Interface, Interface Vs Abstract Classes, Packages-Creating Packages, Using Packages, Access Protection, java.lang.Package.

**Exceptions & Assertions** - Introduction, Exception Handling Techniques-try...catch, throw, throws, finally block, User Defined Exception, Exception Encapsulation and Enrichment, Assertions.

#### **UNIT IV:**

**Multi-Threading:** java.lang.Thread, The main Thread, Creation of New Threads, Thread Priority, Multithreading- Using isAlive() and join(), Synchronization, Suspending and Resuming Threads, Communication between Threads.

**Input/Output:** Reading and Writing data, java.io package.

**Applet:** Applet Class, Applet Structure, Applet Life Cycle, Sample Applet Programs.

#### **UNIT V:**

**Event Handling:** Event Delegation Model, Sources of Event, Event Listeners, Adapter Classes, Inner Classes.

**Abstract Window Toolkit :** Importance of AWT, Java.awt.package, Components and Containers, Button, Label, Check Box, Radio Buttons, List Boxes, Choice Boxes, Text Field and Text Area, Container Classes, LayOuts, Menu, Scroll bar.

**Swings:** Introduction, JFrame, JApplet, JPanel, Components in Swings, Layout Managers, List and JScroll Pane, SplitPane, JTabbedPane, JTree, DialogBox, Pluggable Look and Feel.

#### **Course Outcomes:**

- i. Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
- ii. Write, compile, execute and troubleshoot Java programming for networking concepts.
- iii. Build Java Application for distributed environment.
- iv. Design and Develop multi-tier applications.
- v. Identify and Analyze Enterprise applications.

#### **Text Books:**

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, Saurabh Choudhary, and Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.

#### **References:**

1. JAVA Programming, K.Rajkumar, Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, DreamTech.
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , University Press.
5. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH.
6. Introduction to Java Programming, 7th ed, Y Daniel Liang, Pearson.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester		L	T	P	C
		3	0	0	3
DATABASE MANAGEMENT SYSTEMS					

### Course Objectives:

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL, and System implementation techniques.
- Enable students to model ER diagram for any customized applications.
- Provide knowledge on concurrency techniques.
- Understand normalization theory and apply such knowledge to the normalization of a database.
- To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

### UNIT-I:

**An Overview of Database Management:** Introduction- Importance of Database System, Data Independence- Relation Systems and Others- Summary, Database system architecture, Introduction- The Three Levels of Architecture-The External Level- the Conceptual Level- the Internal Level- Mapping- the Database Administrator-The Database Management Systems- Client/Server Architecture.

### UNIT-II:

**The E/R Models:** The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and ER Diagrams-Entities Attributes, Entity Sets-Relationship and Relationship Sets-Conceptual Design with the ER Models.

**The Relational Model:** Integrity Constraints Over Relations- Key Constraints –Foreign Key Constraints-General Constraints, Relational Algebra and Calculus, Relational Algebra- Selection and Projection- Set Operation, Renaming – Joins- Division- More Examples of Queries, Relational Calculus - Tuple Relational Calculus, Domain Relational Calculus.

### UNIT-III:

**Queries, Constraints, Triggers:** The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and ActiveDatabase.

**Schema Refinement (Normalization) :** Purpose of Normalization or Schema Refinement, Concept of Functional Dependency, Normal Forms Based on Functional Dependency(1NF, 2NF and 3NF), Concept of Surrogate Key, Boyce-Codd Normal Form(BCNF), Lossless Join and Dependency Preserving Decomposition, Fourth NormalForm(4NF).

## **UNIT-IV:**

### **Transaction Management and Concurrency Control:**

Transaction, Properties of Transactions, Transaction Log, Transaction Management with SQL using Commit Rollback and Save Point, Concurrency Control for Lost Updates, Uncommitted Data, Inconsistent Retrievals, and the Scheduler.

**Concurrency Control with Locking Methods:** Lock Granularity, Lock Types, Two Phase Locking For Ensuring Serializability, Deadlocks, Concurrency Control with Time Stamp Ordering: Wait/Die and Wound/Wait Schemes, Database Recovery Management : Transaction Recovery.

## **UNIT-V:**

**Overview of Storages and Indexing:** Data on External Storage- File Organization and Indexing – Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based **Indexing** – Tree- Based Indexing, Comparison of File Organization.

### **Course Outcomes:**

- i. Understand File System Vs Databases.
- ii. Understand the usage of Key Constraints on Database.
- iii. Create, maintain, and manipulate a relational database using SQL.
- iv. Describe ER model and normalization for database design.
- v. Understand efficient data storage and retrieval mechanism, recovery techniques.
- vi. Design and build database system for a given real world problem.

### **Text Books:**

1. Introduction to Database Systems, CJ Date, Pearson.
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition.

### **References Books:**

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education.
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson.
4. Database System Concepts, 5/e, Silberschatz, Korth, TMH.



## B.Tech (Computer Science and Engineering)- R20 Syllabus

### University College of Engineering Vizianagaram

#### JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

II Year-I Semester		L	T	P	C
		3	0	0	3
Advanced Data Structures					

#### Course Objectives:

The objectives of this course is to acquire knowledge on the

- To understand concepts about searching and sorting techniques
- Synthesize efficient algorithms in common engineering design situations using dictionaries.
- emphasize the importance of Trees in developing and implementing efficient problem solving.
- To Understand advanced efficient search trees and it's operations
- Demonstrate a familiarity with major data structures using Graphs.

#### UNIT - I: Searching and Sorting

Searching Algorithms: Linear Search, Binary Search and Fibonacci Search

Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort

External Sorting: Model for external sorting, Multiway merge, Polyphase merge.

#### UNIT - II: Dictionaries

Dictionaries, Hash Tables, Open Hashing, Closed Hashing (Rehashing Methods), Hashing Functions(Division Method, Multiplication Method, Universal Hashing), Skip Lists.

#### UNIT - III: Trees

Basic tree concepts, Binary Trees, Representation of Binary Trees using arrays and linked lists, Operations on a Binary Tree, Binary Tree Traversals, Creation of binary tree from in, pre and post order traversals

Binary Search Trees: Definition, Implementation, Operations- Searching, Insertion and Deletion

#### UNIT - IV: Efficient Search Trees

AVL Trees: Definition, Operations - Insertion, Deletion and Searching, Height of an AVL Tree

B Trees: Definition, Operations - Insertion, Deletion and Searching, B+ Trees

Priority Queues: Definition, Implementation using Lists and Heaps

## UNIT - V: Graphs

Basic concepts, Representations of Graphs: Adjacency list and Adjacency matrix, Graph Algorithms: Graph Traversals- BFS & DFS, Applications, Minimum Spanning Tree- Prim's and Kruskal's Algorithms, Shortest Path Algorithms- Dijkstra's, Transitive Closure- Warshall's and Floyd's Algorithms.

### Course Outcomes:

The students should be able to:

- i. Apply advanced data structure strategies using searching and sorting techniques.
- ii. Design and implement an appropriate hashing function for an application and construct index using hash concepts and Implement dictionaries.
- iii. Design and implement Trees, binary search trees and it's operations
- iv. Incorporate data structures into the applications such as binary search trees, AVL and B Trees. Demonstrate concepts of priority Queues. Examine efficient binary searching trees(AVL,Red-black)
- v. Design and analyze programming problem statements using graphs

### Text Books:

- i. Data Structure with C, Seymour Lipschutz, TMH
- ii. Data Structures, A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage Learning.
- iii. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Anderson Freed, Universities Press

### Reference Books:

- i. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson
- ii. C and Data Structures: A Snapshot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu & EV Prasad, S Chand.
- iii. Data Structures using C, Reema Thareja, Oxford



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester		L	T	P	C
		3	0	0	3
COMPUTER ORGANIZATION & ARCHITECTURE					

### Course Objectives:

- To understand the structure, function and characteristics of computersystem.
- To understand the design of the various functional units and components ofcomputers.
- To explain the function of each element of a memoryhierarchy.
- Illustration of algorithms for basic arithmetic operations using binary and decimal representation.
- Illustration of data paths and control flow for sequencing in CPU"s, Micro Programming of control unit of CPU.

### UNIT-I:

#### Basic Structure of Computers:

Functional unit, Basic Operational Concepts, Bus Structures, System Software, Performance, The History of Computer Development. Data Representation: Data Types, Complements, Fixed Point Representation, Floating Point Representation.

#### Basic Computer Organization and Design:

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory – Reference Instructions, Interrupt, Design of Basic Computer, Design of Accumulator Logic.

### UNIT -II:

**Machine Instruction and Programs:** Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Addressing Modes, Basic Input/output Operations, Importance of Stacks and Queues in Computer Programming Equation. Component of Instructions: Logic Instructions, Shift and Rotate Instructions, Branch Instructions.

**Computer Arithmetic:** Addition, Subtraction, Multiplication and Division Algorithms .Floating point Arithmetic Operations and Decimal Arithmetic Operations.

### UNIT -III:

**The Memory System:** Memory System Consideration RAM and ROM, Flash Memory, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory and Virtual Memory, Secondary Storage: Magnetic Hard Disks, Optical Disks.

**Pipeline Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline.

#### **UNIT -IV:**

**Processing Unit:** Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control.

**Micro Programmed Control:** Microinstructions, Micro Program Sequencing, Wide Branch Addressing and Microinstructions with Next – Address Field.

#### **UNIT -V:**

##### **Input / Output Organization:**

Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

##### **Parallelism:**

Instruction-Level-Parallelism – Parallel Processing Challenges – Flynn’s Classification: SISD, MIMD, SIMD, SPMD and Vector Architectures, – Hardware Multithreading – Multi-Core Processors and Other Shared Memory Multiprocessors.

##### **Course Outcomes:**

- i. Students can understand the architecture of modern computer.
- ii. They can analyze the Performance of a computer using performance equation.
- iii. Understanding of different instruction types.
- iv. Students can calculate the effective address of an operand by addressing modes.
- v. They can understand how computer stores positive and negative numbers.
- vi. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

##### **Text Books:**

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 6th Edition, McGrawHill.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGrawHill.

##### **References:**

1. Computer Organization and Architecture – William Stallings tenth Edition, Pearson/PHI.
2. Computer System Architecture, M. Morris Mano, 3rd Edition Pearson Education.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4<sup>th</sup> Edition PHI/Pearson.
4. Fundamentals of Computer Organization and Design, Sivarama Dandamudi Springer Int. Edition.





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester		L	T	P	C
		0	0	3	1.5
<b>JAVA PROGRAMMING LAB</b>					

### Course Objectives:

- i. To understand the structure and environment of Java.
- ii. To implement the relationship between objects.
- iii. To apply data hiding strategy in objects.
- iv. To implement text processing and error handling.
- v. To organize data using different data structures.
- vi. To create multi-threaded graphical user interface applications.

### List of Experiments:

#### Exercise - 1 (Basics)

- a). Write a JAVA program to display default value of all primitive data type of JAVA.
- b). Write a java program that display the roots of a quadratic equation  $ax^2+bx=0$ . Calculate the discriminate D and basing on value of D, describe the nature of root.
- c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
- d) Write a case study on **public static void main (250 words)**.

#### Exercise - 2 (Operations, Expressions, Control-flow, Strings)

- a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- b) Write a JAVA program to sort for an element in a given list of elements using bubblesort.
- c) Write a JAVA program to sort for an element in a given list of elements using mergesort.
- d) Write a JAVA program using String Buffer to delete, remove character.

#### Exercise - 3 (Class, Objects)

- a) Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
- b) Write a JAVA program to implement constructor.

**Exercise - 4 (Methods)**

- a) Write a JAVA program to implement constructor overloading.
- b) Write a JAVA program to implement method overloading.

**Exercise - 5 (Inheritance)**

- a) Write a JAVA program to implement Single Inheritance.
- b) Write a JAVA program to implement multi level Inheritance.
- c) Write a java program for abstract class to find areas of different shapes.

**Exercise - 6 (Inheritance - Continued)**

- a) Write a JAVA program give example for “super” keyword.
- b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

**Exercise - 7 (Exception)**

- a) Write a JAVA program that describes exception handling mechanism.
- b) Write a JAVA program illustrating Multiple catch clauses.

**Exercise – 8 (Runtime Polymorphism)**

- a) Write a JAVA program that implements Runtime polymorphism.
- b) Write a Case study on run time polymorphism, inheritance that implement in above problem.

**Exercise – 9 (User defined Exception)**

- a) Write a JAVA program for creation of illustrating throw.
- b) Write a JAVA program for creation of illustrating finally.
- c) Write a JAVA program for creation of Java Built-in Exceptions.
- d) Write a JAVA program for creation of User Defined Exception.

**Exercise – 10 (Threads)**

- a) Write a JAVA program that creates threads by extending Thread class .First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds ,(Repeat the same by implementing Runnable).
- b) Write a program illustrating isAlive() and join().
- c) Write a Program illustrating Daemon Threads.

**Exercise - 11 (Threads continuity)**

- a) Write a JAVA program Producer Consumer Problem.
- b) Write a case study on thread Synchronization after solving the above producer consumer problem.

**Exercise – 12 (Packages)**

- a) Write a JAVA program illustrate class path.
- b) Write a case study on including in class path in your OS environment of your package.
- c) Write a JAVA program that import and use the defined your package in the previous Problem.

**Exercise - 13 (Applet)**

- a) Write a JAVA program to paint like paint brush in applet.
- b) Write a JAVA program to display analog clock using Applet.
- c) Write a JAVA program to create different shapes and fill colours using Applet.

**Exercise - 14 (Event Handling)**

- a) Write a JAVA program that display the x and y position of the cursor movement using Mouse.
- b) Write a JAVA program that identifies key-up , key-down events when user entering text in an applet.

**Exercise - 15 (Swings)**

- a) Write a JAVA program to build a Calculator in Swings.
- b) Write a JAVA program to display the digital watch in swing tutorial.

**Exercise – 16 (Swings - Continued)**

- a) Write a JAVA program that to create a single ball bouncing inside a JPanel.
- b) Write a JAVA program JTree as displaying a real tree upsidedown.

**Course Outcomes:**

- i. Create classes and objects for real world identities.
- ii. Implement polymorphic and abstract behavior in objects.
- iii. Implement the parent-child relationships between objects with access protection.
- iv. Create exceptions for handling runtime errors during text processing.
- v. Implement generic data structures for iterating distinct objects.
- vi. Design thread-safe GUI applications for data communication between objects.

**References:**

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.
2. Java: How to Program, Harvey Deitel & Paul Deitel, 6/e, Prentice Hall.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester		L	T	P	C
		0	0	3	1.5
<b>ADVANCED DATA STRUCTURES LAB</b>					

### Course Objectives:

- i. Describe and implement a variety of advanced data structures (searching, sorting, hash tables, priority queues, balanced and digital search trees).
- ii. Analyze the space and time complexity of the algorithms studied in the course.

### List of experiments

1. Write programs to implement the following searching methods:
  - i. Linear Search
  - ii. Binary Search
2. Write programs to implement the following sorting methods:
  - i. Bubble Sort
  - ii. Insertion Sort
  - iii. Selection Sort
  - iv. Quick Sort
  - v. Merge Sort
3. Write a program to implement hashing with separate chaining.
4. Write programs to implement hashing with following rehashing methods for collision resolution:
  - i. Linear Probing
  - ii. Quadratic Probing
  - iii. Pseudo Random Probing
  - iv. Double Hashing
5. Write recursive functions that traverse given binary tree in:
  - i. Pre order
  - ii. In order
  - iii. Post order
6. Write a program to implement search, insert and delete operation on a Binary Search Tree.
7. Write a program to simulate AVL tree rotations.
8. Write a program to implement Heap operations.
9. Write programs to implement the following Graph traversal techniques:
  - i. Breadth First Search
  - ii. Depth First Search
10. Write programs to implement the following Graph algorithms:
  - i. Prim's algorithm
  - ii. Kruskal's algorithm
  - iii. Dijkstra's algorithm
  - iv. Warshall's algorithm
  - v. Floyd's algorithm

**Course Outcomes:**

- i. Apply different searching and sorting technique
- ii. Be able to implement different hashing technique and study clustering problems exhibited.
- iii. Be able to implement Efficient Search trees.
- iv. Understand the implementation and complexity analysis of various graph algorithms



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester		L	T	P	C
		0	0	3	1.5
DATABASE MANAGEMENT SYSTEMS LAB					

### Course Objectives:

- To provide a sound introduction to the discipline of database managementsystem.
- Subject in its own right, rather than as a compendium of techniques and product specific tools.
- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework.
- To give a good formal foundation on the relational model of data.
- To present SQL and procedural interfaces to SQL comprehensively.
- To introduce systematic database design approaches covering conceptual design, logical design and an overview of physical design.

### List of Experiments:

#### SQL:

- Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
- Queries using operators in SQL.
- Queries to Retrieve and Change Data: Select, Insert, Delete, and Update.
- Queries using Group By, Order By, and Having Clauses.
- Queries on Controlling Data: Commit, Rollback, and Savepoint.
- Queries to Build Report in SQL\*PLUS.
- Queries for Creating, Dropping, and Altering Tables, Views, and Constraints.
- Queries on Joins and Correlated Sub-Queries.
- Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features.

#### PL/SQL:

- Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation.
- Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL.
- Write a PL/SQL block using SQL and Control Structures in PL/SQL.
- Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types.
- Write a PL/SQL Code using Procedures, Functions, and Packages FORMS.

15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc.

**Course Outcomes:**

- i. Understand, appreciate, and effectively explain the underlying concepts of database technologies.
- ii. Design and implement a database schema for a given problem-domain Normalize a database.
- iii. Populate and query a database using SQL DML/DDL commands.
- iv. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
- v. Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- vi. Design and build a GUI application using a 4GL.

**Note:** The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

**Text Books/Suggested Reading:**

1. Oracle: The Complete Reference by Oracle Press.
2. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007.
3. Oracle PL/SQL by example, Benjamin Rosenzweig, Elena Silvestrova, Pearson Education, 3/e.
4. Oracle Database Log PL/SQL Programming, Scott Urman, TMH.

**References:**

1. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007.
2. SQL & PL/SQL for Oracle 10g, Dr. P.S. Deshpande.
3. Database Management System, Oracle SQL and PL/SQL, Pranab Kumar Das Gupta, P Radha Krishna, PHI.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester	L	T	P	C
	1	0	2	2

**INTRODUCTION TO PYTHON PROGRAMMING**

### Course Objectives:

The objectives of this course are to acquire knowledge on the

- i. Introduction to Scripting Language.
- ii. Exposure to various problems solving approaches of computer science in various Domains.
- iii. Introduction to various Object-oriented programming features using python.
- iv. Introduction to various data structures using python.
- v. Introduction to various Exception handling mechanism techniques using python.

### UNIT - I: Basics

Features and History of Python, Print and Input functions, variables, keywords, comments

Types: Numerical Types (int, float, complex), Strings, Boolean, Type Conversion

Operators: Arithmetic, Relational, Logical, Bitwise, Assignment, Identity, Membership

Control Flow: Indentation, if-elif-else, while, for, break, continue, pass, else-with loops

### UNIT - II: Functions

Introduction, Required Arguments, Default Arguments, Keyword Arguments, Variable Number of Arguments, Variable Scope and Lifetime, global variables, Lambda Functions, Command Line Arguments

### UNIT - III: Object Oriented Programming

Classes and Objects, built-in class methods and attributes, 'self', constructor, destructor, inheritance, data hiding, overriding methods and overloading operators

### UNIT - IV: Data Structures and Files

Lists, Nested Lists, List Comprehensions, Tuples, Sequences, Sets, Dictionaries

File I/O: opening, closing, reading and writing

### UNIT - V: Exception Handling

Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block Without Exception, the else Clause, Raising Exceptions, Built-in and User-defined Exceptions, The finally block



**Course Outcomes:**

The students should be able to:

- i. Understand and experience with interpretable language
- ii. Analyse various functions in python
- iii. Implement Object oriented programming features using python
- iv. Understand and experienced with different data structures and files using python
- v. Learn various exception handling mechanisms using python

**Text Books:**

- i. Python Programming using problem solving approach, Reema Thareja, Oxford University Press.
- ii. Learning Python, Mark Lutz, O'Reilly.

**Reference Books:**

1. Programming Python, Fourth Edition, Mark Lutz, O'ReillyMedia.
2. Introduction to Computation and Programming Using Python with Application to Understanding, John V. Guttag, PHI.
3. Think Python: How to think like a Computer Scientist, Allen Downey, Green Tea Press.
4. Head First Python: A Brain-Friendly Guide, Second Edition, Paul Barry, O'Reilly.
5. The Python Standard Library, Python 3.6.5 documentation (Web Resource) <https://docs.python.org/3.6.5/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-I Semester	MANDATORY COURSE (AICTE Suggested)	L	T	P	C
		2	0	0	0
CONSTITUTION OF INDIA					

### Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature, and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative.

### UNIT-I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

### UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

### UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

### UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayati Raj: Functions  
PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

### UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women

**Course Outcomes:**

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- i. Understand historical background of the constitution making and its importance for building a democratic India.
- ii. Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
- iii. Understand the value of the fundamental rights and duties for becoming good citizen of India.
- iv. Analyze the decentralization of power between central, state and local self-government.
- v. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
  1. Know the sources, features, and principles of Indian Constitution.
  2. Learn about Union Government, State government and its administration.
  3. Get acquainted with Local administration and Panchayati Raj.
  4. Be aware of basic concepts and developments of Human Rights.
  5. Gain knowledge on roles and functioning of Election Commission

**References:**

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd., New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd., New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

**E-resources:**

1. [nptel.ac.in/courses/109104074/8](https://nptel.ac.in/courses/109104074/8)
2. [nptel.ac.in/courses/109104045/](https://nptel.ac.in/courses/109104045/)
3. [nptel.ac.in/courses/101104065/](https://nptel.ac.in/courses/101104065/)
4. [www.hss.iitb.ac.in/en/lecture-details](http://www.hss.iitb.ac.in/en/lecture-details)



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PROBABILITY AND STATISTICS</b>					

### Course Objectives:

- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various applications Engineering

### Unit – I: Descriptive statistics and methods for data science:

Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance) – Skewness Kurtosis.

### UNIT – II: Probability and Distributions:

Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

### UNIT – III: Sampling Theory:

Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t,  $\chi^2$  and F-distributions – Point and Interval estimations – Standard error and Maximum error of estimate.

### UNIT – IV: Tests of Hypothesis:

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance- Confidence limits-Test of significance for large samples-single and two means – single and two proportions- Student's t- distribution- significance test of a sample mean – significance test of difference between sample means.F-test, chi-square test ( $\chi^2$ ) and test of goodness of fit.

### UNIT – V:Regression analysis:

Method of least squares – Straight line – Parabola – Exponential – Power curves. Regression - Regression coefficients and properties – Curvilinear Regression, Multiple Regression - Correlation – Correlation coefficient – Rank correlation

**Course Outcomes:**

The student should be able to

- i. i. Classify the concepts of data science and its importance
- i. ii. Interpret the association of characteristics and through correlation and regression tools
- ii. iii. Make use of the concepts of probability and their applications and Apply discrete and
- iii. continuous probability distributions
- iv. iv. Infer the statistical inferential methods based on small and large sampling tests
- v. v. Design the components of a classical hypothesis test

**Text Books:**

1. Miller and Freund's, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S. C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

**References:**

1. Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists, 8<sup>th</sup> Edition, Pearson 2007.
2. Jay I. Devore, Probability and Statistics for Engineering and the Sciences, 8<sup>th</sup> Edition, Cengage.
3. Sheldon M. Ross, Introduction to probability and statistics Engineers and the Scientists, 4<sup>th</sup> Edition, Academic Foundation, 2011.
4. Johannes Ledolter and Robert V. Hogg, Applied statistics for Engineers and Physical Scientists, 3<sup>rd</sup> Edition, Pearson, 2010.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester		L	T	P	C
		3	0	0	3
<b>OPERATING SYSTEMS</b>					

### Course Objectives:

- i. Provide knowledge about the services rendered by operating systems.
- ii. Present detail discussion on processes, threads, and scheduling algorithms.
- iii. Expose the student with different techniques of process synchronization and handling deadlocks.
- iv. Discuss various file-system implementation issues and memory management techniques.
- v. Learn mass storage management.

### UNIT-I: Operating Systems Overview:

**Introduction:** Overview of Computer operating system, Operating System Structure, operating systems concepts, operating systems services, System call, System call types, Operating System Generation.

### UNIT-II: Process Management:

**Process concept:** Process Concept, Process Scheduling, Operations on Processes, Inter process Communication.

**Multithreaded Programming:** Overview, Multithreading models, Threading Issues.

**Process scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

Case Study: Linux

### UNIT-III: Synchronization:

**Process Synchronization:** The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples.

**Principles of deadlock** – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Case Study: Linux

### UNIT-IV: Memory Management:

**Memory Management strategies:** Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

**Virtual Memory Management:** Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing.

Case Study: Linux

**UNIT-V: File system Interface-** The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File Sharing, Protection.

**File System implementation:** File system structure, allocation methods, free-space management.

**Mass-storage structure:** Overview of Mass-storage structure, Disk Structure, Disk Attachment, Disk scheduling, Swap Space Management.

Case Study: Linux

**Course Outcomes:**

- i. Understand the importance of operating systems and different types of system calls.
- ii. Analyze the communication between processes and various process scheduling algorithms.
- iii. Understand the process synchronization, different ways for deadlocks handling.
- iv. Analyze various memory mapping techniques and different page replacement methods.
- v. Evaluate various file allocation and disk scheduling algorithms.

**Text Books:**

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009.

**References:**

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhare D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-II Semester		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>FORMAL LANGUAGES AND AUTOMATA THEORY</b>					

### Course Objectives:

- i. Introduce the student to the concepts of Theory of computation in computerscience.
- ii. The students should acquire insights into the relationship among formal languages, formal Grammars and automata.
- iii. Classify machines by their power to recognize languages
- iv. Understand the relationship between languages and their grammars.

### UNIT – I: Finite Automata

Introduction to Automata, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

### UNIT – II: Regular Expressions

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

### UNIT – III:

#### Context Free Grammars

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, EProductions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

#### Pushdown Automata

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.



#### **UNIT – IV: Turing Machine**

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

#### **UNIT – V: Computability**

Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Classes of P and NP, NP Hard and NP-Complete Problems.

#### **Course Outcomes:**

- i. Classify machines by their power to recognize languages.
- ii. Employ finite state machines to solve problems in computing.
- iii. Explain deterministic and non-deterministic machines.
- iv. Comprehend the hierarchy of problems arising in the computer science.
- v. Design Push down Automata
- vi. Design Turing Machines

#### **Text Books:**

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3rd Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, 3rd Edition, PHI, 2007.
3. Theory of Computer Science (Automata, Languages and Computation), 3rd ed. K.L.P. Mishra and
4. N. Chandrasekaran, Thirty-fourth printing (Third Edition) L L April, 2016.

#### **References:**

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-II Semester		L	T	P	C
		3	0	0	3
<b>COMPUTER NETWORKS</b>					

### Course Objectives:

- i. To introduce the fundamental various types of computer networks.
- ii. To understand state-of-the-art in network protocols, architectures, and applications.
- iii. To explore the various layers of OSI Model.
- iv. To introduce UDP and TCP Models.

### UNIT-I:

**Introduction:** Network Hardware and software Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

**Physical Layer:** Guided Transmission Media, Digital Modulation and Multiplexing: frequency division multiplexing, wavelength division multiplexing, synchronous time division multiplexing, statistical time division multiplexing.

### UNIT-II:

**The Data Link Layer** - Design Issues, Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols, Sliding Window Protocols.

**Channel allocation methods:** TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols – IEEE standard 802 for LANs – Ethernet, Token Bus, Token ring, Bridges and IEEE 802.11 and 802.16. Data link layer switching, virtual LANs.

### UNIT-III:

**Network layer Routing Algorithms:** Design Issues, Routing Algorithms-Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms-General principles of congestion control, Congestion prevention policies, Choke packets, Load shedding, and Jitter Control.

**Internet Working:** Tunnelling, internetworking, Fragmentation, Network layer in the internet – IP protocols, IP address, Subnets, Internet control protocols, OSPF, BGP, Internet multicasting, Mobile IP, IPV6.

#### **UNIT IV:**

**The Transport Layer:** Elements of transport protocols – addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, End to end protocols: UDP, Real Time Transport Protocol.

**The Internet Transport Protocol: TCP-** reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call.

#### **UNIT – V:**

**Application Layer:** WWW and HTTP: Architecture- Client (Browser), Server, Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format.

**The Domain Name System:** The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery.

#### **Course Outcomes:**

The students can

- i. Understand OSI and TCP/IP reference models with an emphasis to Physical Layer, Data Link Layer and Network Layer.
- ii. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes. Analyze MAC layer protocols and LAN technologies.
- iii. Solve problems related to Flow control, Error control, Congestion control and Network Routing.
- iv. Design and compute subnet masks and addresses for networking requirements.
- v. Understand how internet networks,

#### **Text Books:**

1. Data Communications and Networks – Behrouz A. Forouzan, Third Edition TMH.
2. Computer Networks, 5ed, David Patterson, Elsevier
3. Computer Networks: Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
4. Computer Networks, Mayank Dave, CENGAGE

#### **References:**

1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, Firouz Mosharraf, McGraw Hill Education
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson The TCP/IP Guide, by Charles M. Kozierok, Free online Resource, <http://www.tcpipguide.com/free/index.htm>.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-II Semester		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY</b>					

### Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting
- Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation.
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

### UNIT-I:

#### Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand, and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

### UNIT– II:

**Theories of Production and Cost Analyses:** Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

### UNIT – III:

#### Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition, and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson’s models – other Methods of Pricing: Business Cycles: Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

## **Unit – IV:**

### **Introduction to Accounting & Financing Analysis:**

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

## **Unit – V:**

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

### **Course Outcomes:**

- i. The Learner is equipped with the knowledge of estimating the Demand and demand elasticity for a product
- ii. The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- iii. One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- iv. The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
- v. To evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

### **Text Books:**

1. Prof.J.V.Prabhakara Rao &Prof.P.Venkata Rao Maruthi Publications
2. S.A.Siddiqui&A.S.Siddiqui New Age International Publishers

### **References:**

1. Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd,
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition
3. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd,
4. Maheswari S.N, An Introduction to Accountancy, Vikas Publishing House Pvt Ltd
5. I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
6. V. Maheswari, Managerial Economics, S. Chand & Company Ltd
7. Mr. Kashi Reddy and Sarawathi, Managerial Economics and Financial Analysis, PHI, 2010 Edition.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-II Semester		L	T	P	C
		0	0	3	1.5
<b>STATISTICS WITH R PROGRAMMING LAB</b>					

### Course Objectives:

- i. This course provides a solid undergraduate foundation in both probability theory and mathematical statistics and at the same time provides an indication of the relevance and importance of the theory in solving practical problems in the real world

### List of Experiments:

1. Write a program to illustrate basic Arithmetic in R.
2. Write a program to illustrate Variable assignment in R.
3. Write a program to illustrate Data types in R.
4. Write a program to illustrate creating and naming a Vector in R.
5. Write a program to illustrate creates a matrix and naming matrix in R.
6. Write a program to illustrate add Column and add a Row in matrix in R.
7. Write a program to illustrate selection of elements in Matrices in R.
8. Write a program to illustrate performing Arithmetic of matrices.
9. Write a program to illustrate Factors in R.
10. Case study of why you need use a Factor in R.
11. Write a program to illustrate Ordered Factors in R.
12. Write a program to illustrate Data frame selection of elements in a Dataframe.
13. Write a program to illustrate sorting a Dataframe.
14. Write a program to illustrate List? Why would you need aList?
15. Write a program to illustrate Adding more elements in to alist.
16. Write a program to illustrate if-else-else-if in R.
17. Write a program to illustrate While and For loops in R.
18. Write a program to illustrate Compare and Matrices and Compare Vectors.
19. Write a program to illustrate Logical & and Logical | operators in R.
20. Write a program to illustrate Functions in Quick sort implementation in R.
21. Write a program to illustrate Function inside function in R.
22. Write a program to illustrate to create Graphs and usage of plot( ) function in R.
23. Write a program to illustrate Customizing and Saving to graphs in R.
24. Write a program to illustrate some built in Mathematical Functions.

**Course Outcomes:**

- i. Understand the fundamental syntax of R through readings, practice exercises, demonstrations, and writing R code.
- ii. Apply critical programming language concepts such as data types, iteration, control structures, functions, and boolean operators by writing R programs and through examples
- iii. Apply the Import a variety of data formats into R using RStudio
- iv. Able to Prepare or tidy data's for in preparation for analysis
- v. Analyze a data set in R and present findings using the appropriate R packages

**Text Books:**

1. The Book of R-A first course in programming and statistics by Tilman M.Davies.
2. R Programming-Robin Evans,version: November 5, 2014.
3. R for Beginners by Emmanuel Paradis.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-II Semester		L	T	P	C
		0	0	3	1.5
<b>COMPUTER NETWORKS LAB</b>					

### Course Objectives:

- i. Understand and apply different network commands
- ii. Analyze different networking functions and features for implementing optimal solutions  
Apply different networking concepts for implementing network solution
- iii. Implement different network protocols

### Experiments:

1. Implement the data link layer framing methods such as character stuffing and bit stuffing.
2. Write a C program to develop a DNS client server to resolve the given hostname.
3. Implement on a data set of characters the three CRC polynomials – CRC-12, CRC-16 and CRC-CCIP.
4. Implement Dijkstra's algorithm to compute the Shortest path in a graph.
5. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm
6. Take an example subnet of hosts. Obtain broadcast tree for it.
7. Write a client-server application for chat using UDP
8. Implement programs using raw sockets (like packet capturing and filtering)
9. Write a C program to perform sliding window protocol.
10. Get the MAC or Physical address of the system using Address Resolution Protocol.
11. Simulate the Implementing Routing Protocols using border gateway protocol (BGP)
12. Simulate the OPEN SHORTEST PATH FIRST routing protocol based on the cost assigned to the path.
13. Install Wireshark Tool on PC and use it to:
14. Capture network traffic.
15. Determine default gateway address of your network.
16. Examine frame format and contents of Ethernet frames.
17. Filter and examine only ICMP traffic.
18. Run various network services like ping, ssh, dns ..etc and examine the traffic captured by Wireshark.



19. Simulate a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped.
20. Simulate a four-node point-to-point network, and connect the links as follows: n0-n2, n1- n2 and n2-n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets by TCP/UDP.
21. Simulate the transmission of ping message over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
22. Simulate an Ethernet LAN using N-nodes (6-10), change error rate and data rate and compare the throughput.
23. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and plot congestion window for different source/destination.

**\* ns2/ns3/CISCO Packet Tracer/OPNET/any other network simulator may be used for simulation experiments.**

### **Course Outcomes:**

- i. Apply the basics of Physical layer in real time applications
- ii. Apply data link layer concepts, design issues, and protocols
- iii. Apply Network layer routing protocols and IP addressing
- iv. Implement the functions of Application layer and Presentation layer paradigms and Protocols

### **Text Books:**

1. Data Communications and Networks – Behrouz A. Forouzan, Third Edition TMH.
2. Computer Networks, 5ed, David Patterson, Elsevier
3. Computer Networks: Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
4. Computer Networks, Mayank Dave, CENGAGE

### **References:**

1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
  2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, Firouz Mosharraf, McGraw Hill Education
  3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
- Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson
- The TCP/IP Guide, by Charles M. Kozierok, Free online Resource,  
<http://www.tcpipguide.com/free/index.htm>.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-II Semester		L	T	P	C
		0	0	3	1.5
<b>OPERATING SYSTEMS LAB</b>					

### Course Objectives:

- i. To study the process management concepts & Techniques.
- ii. To study the memory management concepts.
- iii. To study the file storage management concepts.

### List of Experiments:

1. Simulate the following CPU scheduling algorithms  
a) FCFS b) SJF c) Priority d) Round Robin
2. Simulate the following
3. Multiprogramming with a fixed number of tasks (MFT)
4. Multiprogramming with a variable number of tasks (MVT)
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Detection.
7. Simulate simple paging technique.
8. Simulate the following page replacement algorithms.  
a) FIFO b) LRU c) Optimal
9. Simulate the following File allocation strategies  
a) Sequenced b) Indexed c) Linked
10. Simulate producer consumer problem using semaphores.
11. Simulate dining philosopher's problem using monitors.

### Course Outcomes:

- i. Design the Preemptive and Non-preemptive Scheduling Algorithms.
- ii. Design the Algorithms for efficient memory management.
- iii. Implement programs for handling the Deadlocks in computer systems.
- iv. Simulating File Allocation Strategies.
- v. Apply the synchronization tools for Classical Synchronization Problems.

**Text Books:**

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009.

**References:**

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhare D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

II Year-II Semester		L	T	P	C
		1	0	2	2
BASIC WEB DESIGNING					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- How does a website work and web related terminology.
- Web standards and W3C elements
- Responsive Web Designing
- Client-side Scripting Languages (Front End)
- Domains and Hosting

### UNIT - I: Introduction to Web and Web Design Principles:

Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Web pages, Website, Web browsers and Web servers and Web protocols. Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing ,Designing navigation bar , Page design ,Home Page Layout , Design concept.

### UNIT - II: Introduction to HTML:

What is HTML , HTML Documents, Basic structure of an HTML document ,Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags. Introduction to elements of HTML , Working with Text , Working with Lists, Tables and Frames , Working with Hyperlinks, Images and Multimedia ,Working with Forms and controls.

### UNIT - III: Introduction to Cascading Style Sheets:

Concept of CSS , Creating Style Sheet, CSS Properties , CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects ,Working with Lists and Tables, CSS Id and Class ,Box Model(Introduction, Border properties, Padding Properties, Margin properties) ,CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align,Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color , Creating page Layout and Site Designs.

### UNIT - IV: Introduction to Java Script:

What is Java Script? Basics of Java Script: Variables, functions, and Operators, select HTML elements with Java Script,Java Script Events and Event Handlers,Regular expressions and pattern matching in Java Script. Form validation using Java Script.

## UNIT - V: Introduction to Web Publishing or Hosting:

Creating the Web Site , Saving the site , Working on the web site ,Creating web site structure ,Creating Titles for web pages , Themes-Publishing web sites. Case study: Web publishing and Hosting using Heroku cloud platform(<https://www.heroku.com/>).

### Course Outcomes:

- i. The students should be able to:
- ii. Basic terminology related to web and web development.
- iii. Learn how to design static web pages by using HTML.
- iv. Should be able to create web pages with enhanced look and feel by Using CSS.
- v. Learn to use Java Script for design thick clients and to design interactive responsive form design and validations.
- vi. Should learn to design and host and publish websites in various domains.

<b>Text Books</b>		
Name of Authors	Title of the Book	Publisher
Kogent Learning Solutions Inc.	HTML 5 in simple steps	Dreamtech Press
	A beginner's guide to HTML	NCSA, 14 <sup>th</sup> May, 2003
Murray, Tom/Lynchburg	Creating a Web Page and Web Site	College, 2002
<b>Reference Books</b>		
	Web Designing & Architecture-Educational Technology Centre	University of Buffalo
Steven M. Schafer	HTML, XHTML, and CSS Bible, 5ed	Wiley India
John Duckett	Beginning HTML, XHTML, CSS, and JavaScript	Wiley India
Ian Pouncey, Richard York	Beginning CSS: Cascading Style Sheets for Web Design	Wiley India
Kogent Learning	Web Technologies: HTML, Javascript	Wiley India



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester		L	T	P	C
		3	0	0	3
DESIGN AND ANALYSIS OF ALGORITHMS					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- Analyze the asymptotic performance of algorithms
- Write rigorous correctness proofs for algorithms
- Demonstrate a familiarity with major algorithms and data structures
- Apply important algorithmic design paradigms and methods of analysis
- Synthesize efficient algorithms in common engineering design situations

### UNIT - I:

**Introduction:** What is an Algorithm, Algorithm Specification, Pseudo code Conventions Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities' Performance Measurement.

### UNIT - II:

**Decrease-and-Conquer:** Insertion Sort Algorithms for Generating Combinatorial Objects Decrease-by-a-Constant-Factor Algorithms Variable-Size-Decrease Algorithms

**Dived and Conquer:** Merge Sort, Quick Sort, Multiplication of Large Integers and Strassen's Matrix Multiplication

**Transform and conquer:** Pre-sorting Balanced Search Trees, Heaps and Heap sort

### UNIT - III:

**The Greedy Method:** The General Method, Knapsack Problem, Job Sequencing with Deadlines Minimum-cost Spanning Trees, Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

### UNIT - IV:

**Dynamic Programming:** The General Method Multistage graph ,All - Pairs Shortest Paths, , String Edition, 0/1 Knapsack, Reliability Design, optimal binary search trees.

### UNIT - V:

**Backtracking:** The General Method, The S-Queens Problem, Sum of Subsets, Graph Coloring Hamiltonian Cycles

**Branch and Bound:** The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack problem, LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson problem.

**Course Outcomes:**

The students should be able to:

- i. Argue the correctness of algorithms using inductive proofs and invariants, analyze worst-case running times of algorithms testing asymptotic analysis
- ii. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms
- iv. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ these paradigms Synthesize greedy algorithms and analyze them.
- v. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms, and analyze them
- vi. Describe the Backtracking and branch and bound paradigms and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize Backtracking and branch and bound algorithms, and analyze them

**Text Books:**

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press
2. Introduction to the design and analysis of Algorithms Anany Levitin Pearson ,3rd edition
3. Introduction to Algorithms Thomas H Cormen PHI Learning

**References:**

1. The Design and Analysis of Computer Algorithms, Alfred V Aho John E Hopcroft Jeffrey D Ullman
2. Algorithm Design, Jon Kleinberg, Pearson
3. Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw-Hill Education, 2006.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester		L	T	P	C
		3	0	0	3
<b>COMPILER DESIGN</b>					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- i. The phases of a compiler
- ii. Design of lexical analyzers, Syntax analyzers, Intermediate code generators
- iii. Usage of Lex/Bison tools in writing compilers
- iv. Different optimizations and analyses required to do those optimizations
- v. Issues in the code generation, code generation generational algorithms

### UNIT - I:

#### Introduction and Lexical Analysis

Language Processors, the structure of a compiler, the science of building a compiler, phases of a compiler. Lexical Analysis: The role of the lexical analyzer, identifying tokens, Transition diagrams for recognizing tokens, Input buffering, The lexical analyzer generator Lex, Finite automata, Conversion from regular expressions to automata, design of a lexical analyzer generator, Optimization of DFA-based pattern matchers.

### UNIT - II:

#### Syntax Analysis

Introduction, Context-Free Grammars, BNF(Backus-Naur Form), EBNF(Extended Backus-Naur Form). Preprocessing of grammars: left recursion elimination, left factoring. Top-Down Parsing: Recursive-descent parsers, LL(1) parsers. Bottom-Up parsing: Introduction to LR parsers, Simple LR, Canonical LR, Lookahead LR. Extending parsers to handle ambiguous grammars, Parser generators Yacc/Bison.

### UNIT – III:

#### Syntax-Directed Translation, Semantic Analysis, Intermediate Code Generation

Syntax-Directed Definitions, Evaluation orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's. Intermediate code generation: Variants of Syntax trees, Three-address code, Types and declarations, Type checking, Control flow, Back patching, Switch-Statements, Intermediate Code for Procedures.



## **UNIT - IV:**

### **Code Optimization, Run-time Environment**

Run-Time Environments: Storage organization, Activation record, Stack allocation, Access to nonlocal data on the stack, Heap management, Introduction to garbage collection, Introduction to trace-based collection. Machine-Independent optimizations: The principal sources of optimization, Basic blocks and flow graphs, Introduction to data-flow analysis, Foundations of data-flow analysis, Constant propagation.

## **UNIT - V: Target Code Generation**

Code Generation: Issues in the design of a Code Generator, The target language, Addresses in the target code, A simple code generator.

Machine-dependent Optimizations: Peephole optimization, Register allocation and assignment, Dynamic Programming code generation.

### **Course Outcomes:**

The students should be able to:

- i. Understand the basics of language processing and implement lexical analyzer for any language
- ii. Understand the different types of parsing and implement parser for any language
- iii. Understand the different intermediate code representations and use Syntax directed definitions to design an intermediate code generator for any language construct.
- iv. Understand the basics of data flow analysis, optimizations, and run time environment required for handling recursive procedures
- v. Understand the issues in the code generation and code generation algorithms.

### **Text Books:**

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson.
2. Compiler Construction-Principles and Practice, Kenneth C Loudon, Cengage Learning.

### **References:**

1. Modern Compiler Implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
2. The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
3. lex & yacc, 2nd Edition by John Levine, Doug Brown, Tony Mason

### **E-resources:**

1. <https://www.edx.org/course/compilers>
2. <https://nptel.ac.in/courses/106/108/106108113/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester		L	T	P	C
		3	0	0	3
DATA MINING & DATA WAREHOUSING					

### Course Objectives:

Students undergoing this course are expected to:

- Understand the concepts of Data Ware housing and DataMining
- Understand various data mining functionalities and Extract knowledge using data mining techniques
- Characterize the kinds of patterns that can be discovered by classification, clustering, and association rulemining.
- Master data mining techniquesinvarious applications like social,scientific,andenvironmentalcontext.
- Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

### UNIT –I: Data Mining Systems and Knowledge Discovery Process:

**Data Warehouse and OLAP Technology:** An Overview- What Is a Data Warehouse. A Multidimensional Data Model - Need for Online Analytical Processing - OLTP V/s OLAP -OLAP Operations in Multidimensional Data Model. Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

**Need and Usage of Data Mining Technologies** - Overview of Knowledge Discovery Process from Databases—What Motivated Data Mining - Why Is It Important - Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in DataMining.

### UNIT–II: Data Pre-processing:

**Data Exploration:** Data Objects and attribute types -Statistical description of data- Descriptive Data Summarization-Data Visualization - Data similarity and dissimilarity measures.

**Data Pre-processing:** Why Pre-process the Data -Data Cleaning-Data Integration-Data Reduction-Data Transformation and Data Discretization.

### UNIT–III: Classification:

Basic issues regarding classification and predication - General Approach to solving a classification problem- Decision Tree Classification, Attribute Selection Measures, Tree Pruning- Bayesian Classification – Rule Based Classification – Support Vector Machines.

**Classification Model Evaluation and Selection** - Accuracy and Error measures, Holdout, Random Sampling, Cross Validation, Bootstrap, Comparing Classifier performance using ROC Curves.

#### **UNIT–IV: Mining Frequent Patterns and Association Rules:**

Basic Concepts-Problem Definition- Market Basket Analysis- Frequent Itemsets- Closed Itemsets and Association Rules - Frequent Pattern Mining - Efficient and Scalable Frequent Itemset Mining Methods- the Apriori Algorithm for finding Frequent Itemsets Using Candidate Generation - Generating Association Rules from Frequent Itemsets - A pattern growth approach for mining Frequent Itemsets- FP-Growth Algorithm

#### **UNIT V: Cluster Analysis:**

Basics and Importance of Cluster Analysis- Clustering techniques- Different Types of Clusters- Partitioning Methods (K-Means, K Medoids) -Strengths and Weaknesses. Hierarchical Methods (Agglomerative, Divisive) - Density-Based Methods (DBSCAN, OPTICS)-

#### **Course Outcomes:**

After completion of the course, students should be able to:

- i. Understand Data Warehouse fundamentals, Data Mining concepts, principles and its functionalities
- ii. Pre process the data using various Data Pre processing Techniques for mining applications
- iii. Design and deploy appropriate classification techniques to solve real world problems and further be able to assess the strengths and weaknesses of various methods and algorithms to analyze their behavior.
- iv. Demonstrate Association analysis techniques for generating association rules from data.
- v. Use different Clustering techniques to cluster data and Cluster the high dimensional data for better organization of the data

#### **Text Books:**

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

#### **References:**

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining :Vikram Pudi and P. Radha Krishna, Oxford.
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J.Zaki,
4. Wagner Meira, Jr, Oxford
5. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

#### **E-resources:**

1. [http://onlinecourses.nptel.ac.in/noc18\\_cs14/preview](http://onlinecourses.nptel.ac.in/noc18_cs14/preview) (NPTEL course by Prof.Pabitra Mitra)
2. [http://onlinecourses.nptel.ac.in/noc17\\_mg24/preview](http://onlinecourses.nptel.ac.in/noc17_mg24/preview)  
(NPTEL course by Dr. Nandan Sudarshanam & Dr. Balaraman Ravindran)
3. [http://www.saedsayad.com/data\\_mining\\_map.htm](http://www.saedsayad.com/data_mining_map.htm)



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	OPEN ELECTIVE COURSE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3
<b>NETWORK ESSENTIALS</b>					

### Course Objectives:

- i. Understanding the necessary skills and knowledge required to configure, implement, maintain and troubleshoot TCP/IP-based computer networks.
- ii. learn the concepts of IP addressing, computer networking cabling and components, network security, and subnetting.
- iii. Understanding the concepts of Repeaters, Hub, Switches, Bridges, Routers, and Gateways etc.

### UNIT - I: Network Addressing

Logical vs Physical Addressing, MAC Addressing, IPv4 and IPv6 Addresses, Subnetting, Supernetting, Classless Inter Domain Routing, Dynamic Host Control Protocol (DHCP), Automatic private IP addressing (APIPA), TCP and UDP ports and sockets.

### UNIT - II: Wired Networking

Twisted Pairs: Structured Cabling, Horizontal Cabling, UTPs and STPs, Terminating Cables, Straight through and crossover cabling, cable testing and troubleshooting. Fibre Optics: Fibre Attenuation and dispersion, optical components, intermediate components, detectors, fibre classification, optical networking, safety.

### UNIT - III: Wireless Networking

IEEE 802.11 wireless LAN standard, Bluetooth, WiMax, RFID, Cellular Communications, Point-to-Point wireless networks, Wireless Encryption (WEP and WPA)

### UNIT - IV: Internetworking

Networking Devices: Repeaters, Hubs, Switches, Multi-Layer Switches, Bridges, Routers, Gateways, Wireless Access Points and Wireless Routers, Switch and Router Configuration

### UNIT - V: Trouble Shooting and Advances

Troubleshooting: Systematic troubleshooting process, Documentation, Software and hardware tools VoIP, Protocol Analyzers and Packet Sniffers, Software Defined Networking

**Course Outcomes:**

- i. Understand and building the skills of subnetting and routing mechanisms.
- ii. Understand how the Internet works today.
- iii. Demonstrate Conversant with the latest 3G/4G and WiMAX networks and its architecture.
- iv. Design wireless network environment for any application using latest wireless protocols and standards.
- v. Solve the problems of Hardware and Software trouble shooting.

**Text Books:**

1. Networking Essentials: A CompTIA Network+ N10-007 Textbook, Jeffrey S. Beasley, PiyasatNilkaew, Pearson Education.
2. Cisco Networking Essentials, Troy McMillan, Wiley, 2015.

**References:**

1. Cisco Networking Essentials for Educational Institutions, CISCO Press.
2. Guide to Networking Essentials, Greg Tomsho, Cengage Learning, 2015.
3. Networking Essentials, CISCO Networking Academy ([www.netacad.com](http://www.netacad.com))



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>
<b>ADVANCED JAVA PROGRAMMING</b>					

### Course Objectives:

- i. Getting the student to be well trained in Advanced Java Programming skills for an easy entry in the IT Industry.

### UNIT –I:

Recapitulation of XHTML, XHTML5, Java Swing package – use of System class – Applet Context – signed applet – object serialization- shallow and deep copying – Java collections –Iterators – Array Lists – sets –hashset-hash table- queue- priority queue class-vector class- comparable interface.

### UNIT – II:

Java Beans Introduction to Java Beans, Advantages of Java Beans, JDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizers, Java Beans API

### UNIT - III:

Introduction to Servlets: Lifecycle of a Servlet, The Servlet API, The javax.servelet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, servlet chaining-Security Issues.

### UNIT -IV:

Introduction to JSP The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

### UNIT - V:

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Data between Pages – Sharing Session and Application Data – Memory Usage Considerations

**Course Outcomes:**

- i. Construct a Web Application using Servlets
- ii. Construct a Web application using Java ServerPages
- iii. Construct an enterprise application using SessionBeans
- iv. Construct an enterprise application using Entity Beans linked with Database

**Text Books:**

1. Internet and World wide web- How to program ,Dietel and Nieto , Pearson.
2. (Chapters:3, 4, 8, 9, 10, 11, 12 to 18)
3. The Complete Reference, Java 2 , 3ed, Patrik Naughton, Herbert Schildt, TMH. (Chapters: 19, 20, 21, 22, 25,27)
4. Java Server Pages , Hans Bergstan, Oreilly ( Chapters:1-9)

**References:**

1. Jakarta Struts cook book, Bill Siggelkow, SPD, Oreilly( Chapter8)
2. Murach's, Beginning Java JDK5, Murach,SPD.
3. An introduction to Web Design and Programming, WangThomson
4. Web application technologies concepts, Knuckles, JohnWiley.
5. Programming world wide web, Sebesta,Pearson
6. Building Web Applications, NIIT,PHI
7. Web Warrior Guide to Web Programing, Bai, Ekedaw, Thomas,Wiley
8. Beginning Web Programming, Jon Duckett ,Wrox,Wiley
9. Java server pages, Pekowsky,Pearson



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	OPEN ELECTIVE COURSE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3
<b>DEVOPS</b>					

### Course Objectives:

- i. DevOps improves collaboration and productivity by automating infrastructure and
- ii. Workflows and continuously measuring applications performance.

### UNIT- I:

Phases of Software Development life cycle. Values and principles of agile software development.

### UNIT –II:

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

### UNIT –III:

DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes.

### UNIT –IV:

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment, Benefits of CI/CD, Metrics to track CICDpractices

### UNIT -V:

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

### Course Outcomes:

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

- i. Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility
- ii. Describe DevOps & DevSecOps methodologies and their keyconcepts
- iii. Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloudmodels
- iv. Set up complete private infrastructure using version control systems and CI/CDtools
- v. Know about DevOps maturitymodel.



**Text Books:**

1. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations is considered the DevOps bible. It is written by Gene Kim, Jez Humble, Patrick Debois, and John Willis
2. Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, is by Jez Humble and David Farley
3. Effective DevOps: Building A Culture of Collaboration, Affinity, and Tooling at Scale by Jennifer Davis & Ryn Daniels.

**References/Web Links:**

1. <https://www.udacity.com/course/intro-to-devops--ud611> - Good online course with sample exercises.
2. <http://www.edureka.co/devops> - Online Training covering high level process and tools. (Needs Registration)
3. [https://www.edx.org/course?search\\_query=devops](https://www.edx.org/course?search_query=devops) – Has no. of courses from MS and Redhat.
4. <https://www.codementor.io/devops/tutorial> - Basic Tutorial on DevOps.
5. <https://mva.microsoft.com/training-topics/devops#!lang=1033> – Lists no. of courses related to DevOps and various tools, methods used.
6. <http://devops.com/> - A good blog, has lots of contents.
7. <https://dzone.com/devops-tutorials-tools-news> - Lots of links and tutorials



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	OPEN ELECTIVE COURSE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3
ADVANCED WEB TECHNOLOGIES					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- This course is designed to introduce students with basic web programming experience to the advanced web programming languages and techniques associated with the World Wide Web.
- The course will introduce web-based media-rich programming tools for creating interactive web pages.
- The course will introduce Web Frame works like React JS and Angular JS for quick and efficient design and implementation of web applications.

### UNIT – I

#### Introduction to HTML5, CSS3 and Boot strap:

Basic Syntax, Standard HTML Document Structure, HTML5 tags ,Audio, video, 2D canvas Drawing and animations using HTML5.

**CSS 3:** What is SCSS, Difference between CSS and SCSS, Introduction to SASS tool and CSS template design using Boot Strap.

### UNIT - II:

#### Java Script and DHTML:

DHTML: Java Script DOM, Interactive and responsive web page designing, Positioning Moving and Changing Elements. Java Script Web Frame works: React JS, Angular JS and Vue JS, Single Page Application(SPA) Design and Development using Angular JS.

### UNIT - III:

**XML:** Introduction to XML, XML vs HTML, Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

**AJAX A New Approach:** Introduction to AJAX. Request and Response mechanism of AJAX.

### UNIT - IV:

**PHP Programming:** Introducing PHP: Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL.

## **UNIT - V:**

**Web Services:** JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java WebService Client-Describing Web Services: WSDL- Representing Data Types: XML SchemaCommunicating Object Data: SOAP Related Technologies-Software Installation-Storing Java Objects as Files-Databases and Java Servlets.

### **Course Outcomes:**

The students should be able to:

- i. Analyze a web page and Create web pages using HTML5 and Cascading Styles sheets 3 and Boot strap.
- ii. Build dynamic web pages using Java Script and Write simple client-side scripts using AJAX.
- iii. Learn to use XML for data exchange and transfer over web and XML parsing and validation techniques.
- iv. Build web applications using PHP.
- v. Describe a java web services.

### **Text Books:**

1. Programming the World Wide Web, Robert W Sebesta, 7ed, Pearson.
2. Introducing HTML5 (Voices That Matter) 2nd Edition by Bruce Lawson / Remy Sharp Lawson / Sharp, Kindle publishers.
3. Web Technologies, Uttam K Roy, Oxford
4. HTML, CSS, and JavaScript All in One: Covering HTML5, CSS3, and ES6, Sams Teach Yourself 3rd Edition, by Julie Meloni and, Jennifer Kyrnin. Pearson
5. JavaScript Frameworks for Modern Web Development: The Essential Frameworks, Libraries, and Tools to Learn Right Now 2nd ed. Edition by Sufyan bin Uzayr , Nicholas Cloud , Tim Ambler. Apress.
6. Java Web Services: Up and Running: A Quick, Practical, and Thorough Introduction 2<sup>nd</sup>
7. Edition, Kindle Edition by Martin Kalin.

### **References:**

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly( 2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	Professional Elective Courses	L	T	P	C
		3	0	0	3
ARTIFICIAL INTELLIGENCE					

### Course Objectives:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
- To understand the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

### UNIT- I:

**Introduction:** history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

### UNIT -II:

**Problem solving:** state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A\*, constraint satisfaction.

**Problem reduction and game playing:** Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

### UNIT -III:

**Logic concepts:** Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic.

### UNIT -IV:

**Knowledge representation:** Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

**Advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web

## **UNIT–V:**

**Expert system and applications:** Introduction phases in building expert systems, expert system versus traditional systems  
**Uncertainty measure:** probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory, Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

### **Course Outcomes:**

- i. Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
- ii. Apply the language/framework of different AI methods for a given problem
- iii. Implement basic AI algorithms- standard search algorithms or dynamic programming
- iv. Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports
- v. Design Expert Systems using fuzzy logic theory

### **Text Books:**

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning
2. Artificial intelligence, A modern Approach, 2nd ed, Stuart Russel, Peter Norvig, PEA

### **References:**

1. Artificial Intelligence- Deepak Khemani, TMH, 2013
2. Introduction to Artificial Intelligence, Patterson, PHI
3. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Luger, 5th ed, PEA

### **E-Resources:**

1. <https://nptel.ac.in/courses/106/105/106105077/>
2. <http://aima.cs.berkeley.edu/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	Professional Elective Courses	L	T	P	C
		3	0	0	3
PRINCIPLES OF PROGRAMMING LANGUAGES					

### Course Objectives:

- To understand and describe syntax and semantics of programming languages.
- To understand data, data types, and basic statements.
- To understand call-return architecture and ways of implementing them.
- To understand object-orientation, concurrency, and event handling in programming Languages.
- To develop programs in non-procedural programming paradigms.

### UNIT- I:

**Syntax and Semantics:** Evolution of Programming Languages, Describing Syntax, Context, Free Grammars, Attribute Grammars, Describing Semantics, Lexical Analysis, Parsing, Recursive - Decent Bottom - Up Parsing.

### UNIT- II:

**Data, Data Types, and Basic Statements:** Names, Variables, Binding, Type Checking, Scope, Scope Rules, Lifetime and Garbage Collection, Primitive Data Types, Strings, Array Types, Associative Arrays, Record Types, Union Types, Pointers and References, Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Assignment Statements, Mixed Mode Assignments, Control Structures – Selection, Iterations, Branching, Guarded Statements.

### UNIT -III:

**Sub Programs and Implementations:** Subprograms, Design Issues, Local Referencing, Parameter Passing, Overloaded Methods, Generic Methods, Design Issues for Functions, Semantics of Call and Return, Implementing Simple Subprograms, Stack and Dynamic Local Variables, Nested Subprograms, Blocks, Dynamic Scoping.

### UNIT- IV:

**Object- Orientation, Concurrency, and Event Handling:** Object – Orientation, Design Issues for OOP Languages, Implementation of Object, Oriented Constructs, Concurrency, Semaphores, Monitors, Message Passing, Threads, Statement Level Concurrency, Exception Handling, Event Handling.

## **UNIT- V:**

**Functional Programming Languages:** Introduction to Lambda Calculus, Fundamentals of Functional Programming Languages, Programming with Scheme, – Programming with ML.

**Logic Programming Languages:** Introduction to Logic and Logic Programming, Programming with Prolog, Multi - Paradigm Languages.

### **Course Outcomes:**

- i. Describe syntax and semantics of programming languages.
- ii. Explain data, data types, and basic statements of programming languages.
- iii. Design and implement subprogram constructs, Apply object - oriented, concurrency, and event.
- iv. Handling programming constructs. Develop programs in Scheme, ML, and Prolog.
- v. Understand and adopt new programming languages.

### **Text Books:**

1. Robert W. Sebesta, “Concepts of Programming Languages”, Tenth Edition, Addison Wesley, 2012.
2. Programming Languages, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH.

### **References:**

1. R. Kent Dybvig, “The Scheme programming language”, Fourth Edition, MIT Press, 2009.
2. Jeffrey D. Ullman, “Elements of ML programming”, Second Edition, Prentice Hall, 1998. Richard A. O’Keefe, “The craft of Prolog”, MIT Press, 2009.
3. W. F. Clocksin and C. S. Mellish, “Programming in Prolog: Using the ISO Standard”, Fifth Edition.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	Professional Elective Courses	L	T	P	C
		3	0	0	3
COMPUTER GRAPHICS					

### Course Objectives:

- To develop, design and implement two and three dimensional graphical structures
- To learn Creation, Management and Transmission of Multimedia objects.

### UNIT-I:

**Introduction to Graphics:** Application areas of Computer Graphics, overview of graphics systems, video-display devices, graphics monitors and workstations and input devices.

**2D Primitives:** Output Primitives-Line, Circle and Ellipse drawing algorithms, Attributes of output primitives, Two dimensional Geometric transformations, Two dimensional viewing Line, Polygon, Curve and Text clipping algorithms.

### UNIT-II:

**3D Concepts:** Parallel and Perspective projections - Three-dimensional object representations – Polygons, Curved lines, Splines, Quadric Surfaces, - Visualization of data sets - 3D transformations – Viewing -Visible surface identification.

### UNIT-III:

**Illumination and Shading:** Background, simple lighting model, shading models, intensity representation, color models, texture synthesis

### UNIT-IV:

#### Graphics Hardware and Software:

Graphics programming using OpenGL-Basic graphics primitives, Drawing three dimensional objects, Drawing three dimensional scenes.

**Rendering:** Introduction to shading models, Flat and Smooth shading, Adding texture to faces, Adding shadows of objects, Building a camera in a program, Creating shaded objects.

### UNIT- V:

**Fractals:** Fractals and Self similarity, Peano curves, Creating image by iterated functions, Mandelbrot sets, Julia Sets, Random Fractals

**Overview of Ray Tracing:** Intersecting rays with other primitives, Adding Surface texture, Reflections and Transparency, Boolean operations on Objects.



**Course Outcomes:**

- i. To learned various algorithms for drawing objects in 2D transformations like line, circle, and ellipse.
- ii. Apply projections and visible surface detection techniques for display of 3D scene on 2D screen.
- iii. Able to select color model for lighting and shading of objects.
- iv. To get an idea about the structure of OpenGL graphic software.
- v. Able to create image using fractals and iterated functions

**Text Books:**

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, Pearson Education.
2. F.S. Hill, Computer Graphics using OpenGL, Pearson Education.

**References:**

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics Principles and practice in C, Pearson Education.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	OPEN ELECTIVE COURSE/ JOB ORIENTED ELECTIVE	L	T	P	C
		3	0	0	3
EMBEDDED SYSTEMS					

### Course Objectives:

- Technology capabilities and limitations of the hardware, software components
- Methods to evaluate design tradeoffs between different technology choices.
- Design Methodologies

### UNIT -I:

Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components

### UNIT-II:

8-bit microcontroller's architecture: Characteristics, quality attributes applications specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

### UNIT -III:

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

### UNIT -IV:

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, livelock, the dining philosopher's problem.

**UNIT-V:** The producer -consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and firmware.

**Course Outcomes:**

- i. Understand the basics of an embedded system
- ii. Program an embedded system
- iii. Design, implement and test an embedded system.
- iv. Identify the unique characteristics of real-time systems
- v. Explain the general structure of a real-time system
- vi. Define the unique design problems and challenges of real-time systems

**Text Book:**

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

**References:**

1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, Pearson
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	OPEN ELECTIVE COURSE/ JOB ORIENTED ELECTIVE	L	T	P	C
		0	0	3	1.5
COMPILER DESIGN LAB					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- Implementation of a compiler for a basic language
- Lex/Yacc specifications for designing frontend of a compiler
- MIPS instruction set

### List of experiments

- Check the output of different compilers gcc, g++, clang, clang++, javac, python etc by running respective language programs with different flags. (purpose to understand preprocessor, optimizations, linker)
- The Language called TinyCStr is described as follows
  - Every TinyCStr program has one or more functions and syntax of function declaration and function definition is similar to C, one function must be main.
  - Every TinyCStr function has zero or statements
  - The possible statements are declaration, assignment, conditional statements (if, else, for, while) except switch.
  - TinyCStr supports primitive data types of C and a string data type
    - Implement a lexical analyser for TinyCStr using flex/lex
    - Implement a parser for TinyCStr using bison/yacc and generate AST (Abstract Syntax Tree)
    - Generate a 3-address code from the AST
    - Generate MIPS instructions from 3-address code and run it on SPIM simulator
- Write a program illustrating code optimization techniques:
  - Constant folding
  - Copy propagation
  - Common subexpression elimination
  - Loop unrolling
  - Dead code elimination

**Course Outcomes:**

The students should be able to:

- i. Understand the different phases of compilation and the working of compilers like gcc, clang etc
- ii. Implement lexical analyzer for any language
- iii. Implement parser for any language
- iv. Implement 3-address code generator for simple programming constructs
- v. Implement MIPS code generator by considering simple programming constructs

**Text Books:**

1. flex & bison by John Levine Released August 2009 Publisher(s): O'Reilly Media, Inc.
2. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson.

**References:**

1. LLVM Cookbook, Mayur pandey

**E-resources:**

1. <https://llvm.org/>
2. <https://gcc.gnu.org/>
3. [https://www.dsi.unive.it/~gasparetto/materials/MIPS\\_Instruction\\_Set.pdf](https://www.dsi.unive.it/~gasparetto/materials/MIPS_Instruction_Set.pdf)



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester		L	T	P	C
		0	0	3	1.5
<b>DATA MINING LAB</b>					

### Course Objectives:

- i. Practical exposure on implementation of well known data mining tasks.
- ii. Exposure to real life datasets for analysis and prediction.
- iii. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
- iv. Handling a small data mining project for a given practical domain.

**Software Requirements:** WEKA Tool/ R Programming/ Python Programming

### List of Experiments:

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contact lenses.arff using apriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris.arff using simplek-means
10. Demonstration of clustering rule process on dataset student.arff using simplek-means.

### Course Outcomes:

- i. The data mining process and important issues around data cleaning, preprocessing and integration.
- ii. The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.
- iii. Ability to add mining algorithms as a component to the existing tools.
- iv. Ability to apply mining techniques for realistic data.
- v. Demonstrate the classification, clustering and etc. in large data sets.

**Text Books:**

1. Data Mining: Concepts and Techniques- Solution Manual- 3rd Edition- by Jiawei Han, Micheline Kamber, Jian Pei.
2. Data Mining Concepts and Techniques- Third Edition- Jiawei Han University of Illinois at Urbana–Champaign, Micheline Kamber and Jian Pei.

**References:**

1. Data Mining: Concepts, Models, Methods, and Algorithms, Third Edition-Wiley- author by Mehmed Kantardzic.
2. Data Mining and Analysis Fundamental Concepts and Algorithms- authors by Mohammed J.Zaki and JR.Wagner Meira



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester		L	T	P	C
		1	0	2	2
ADVANCED PYTHON PROGRAMMING					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- Introduction to various modules and packages
- Use various Python standard libraries in data mining and machine learning models.
- Introduction to Python graphics and GUI
- Introduce multithreading and networking operations using python
- Introduce Data analysis using Pandas and Numpy

### UNIT - I: Modules and Packages

Introduction modules, import and from-import, Packages in Python, creating and importing used defined modules and packages, installing packages with PIP.

### UNIT - II: Python Standard Library

Numeric and mathematical modules (numbers, math, cmath, decimal, fractions, random, statistics), Text processing (string, re), date & time, calendar, operating system, web browser

### UNIT - III: Graphics and GUI

Graphics with turtle: Motion Control, Pen, Colour, Fill, multiple turtles, reset and clear  
GUI design with tkinter: Button, Canvas, Checkbutton, Entry, Frame, Label, Listbox, Menu, Menubutton, Message, Radiobutton, Scale, Scrollbar, Text

### UNIT - IV: Multi-Threading and Networking

Multithreading: Starting a New Thread, Threading Module, Creating Thread Using Threading Module, Synchronizing Threads, Multithreaded Priority Queue  
Python Socket Module; socket, bind, listen, accept, connect, read, write, close, TCP echoserver and TCP echoclient, UDP echoserver, UDP echoclient, Handling multiple clients at once, the select module

### UNIT - V: Data Analysis

Numpy: Introduction to numpy, Creating arrays, Using arrays and Scalars, Indexing Arrays, Array Transposition, Array Processing, Array Input and Output  
Pandas: Introduction to pandas, Series in pandas, Index objects, Reindex, Drop Entry, Selecting Entries, Data Alignment, Rank and Sort, Summary Statics, Missing Data, Index Heirarchy



**Course Outcomes:**

The students should be able to:

- i. Demonstrate and implement various modules and packages
- ii. Understand various standard library functions
- iii. Implement graphics and GUI using Turtle and Thinker
- iv. Analyse Multithreading and Networking operations using Python
- v. Demonstrate and implement data analysis using Numpy and Pandas

**Text Books:**

- i. Python Programming using problem solving approach, Reema Thareja, Oxford University Press.
- ii. Learning Python, Mark Lutz, O'Reilly.

**Reference Books:**

1. Programming Python, Fourth Edition, Mark Lutz, O'ReillyMedia.
2. Introduction to Computation and Programming Using Python with Application to Understanding, John V. Guttag, PHI.
3. Think Python: How to think like a Computer Scientist, Allen Downey, Green Tea Press.
4. Head First Python: A Brain-Friendly Guide, Second Edition, Paul Barry, O'Reilly.
5. The Python Standard Library, Python 3.6.5 documentation (Web Resource) <https://docs.python.org/3.6.5/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-I Semester	Mandatory Course (AICTE)	L	T	P	C
		2	0	0	0
PROFESSIONAL ETHICS AND HUMAN VALUES					

### Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others.
- To create awareness on assessment of safety and risk
- Provide depth knowledge on framing of the problem and determining the facts, provide depth Knowledge on codes of ethics.

### Unit - I: Human Values:

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others –Living Peacefully –Caring –Sharing –Honesty -Courage-Cooperation–Commitment – Empathy – Self Confidence Character –Spirituality.

### Unit - II: Engineering Ethics:

Senses of 'Engineering Ethics-Variety of moral issued –Types of inquiry –Moral dilemmas –Moral autonomy –Kohlberg's theory-Gilligan's theory-Consensus and controversy –Models of professional roles-Theories about right action-Self-interest -Customs and religion –Uses of Ethical theories – Valuing time –Cooperation –Commitment.

### Unit - III: Engineering as Social Experimentation

Engineering As Social Experimentation –Framing the problem –Determining the facts –Codes of Ethics –Clarifying Concepts –Application issues –Common Ground -General Principles –Utilitarian thinking respect for persons

### UNIT- IV: Engineers Responsibility for Safety and Risk:

Safety and risk –Assessment of safety and risk –Risk benefit analysis and reducing risk-Safety and the Engineer-Designing for the safety-Intellectual Property rights (IPR).

### UNIT - V: Global Issues

Globalization –Cross-culture issues-Environmental Ethics –Computer Ethics –Computers as the instrument of Unethical behavior –Computers as the object of Unethical acts –Autonomous Computers-Computer codes of Ethics –Weapons Development -Ethics and Research –Analyzing Ethical Problems in research.

**Course Outcomes:**

Students will be able to:

- i. Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field, Articulate what makes a particular course of action ethically defensible
- ii. Identify the multiple ethical interests at stake in a real-world situation or practice, Assess their own ethical values and the social context of problems
- iii. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
- iv. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
- v. Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

**Text Books:**

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and, V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009
2. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger –Tata McGraw-Hill– 2003.
4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, DharanikotaSuyodhana-Maruthi Publications.
5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-LaxmiPublications.
6. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
7. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester		L	T	P	C
		3	0	0	3
<b>SOFTWARE ENGINEERING</b>					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- i. To understand the software life cycle models.
- ii. To understand the software requirements and SRS document.
- iii. To understand the importance of modeling and modeling languages.
- iv. To design and develop correct and robust software products.

### UNIT – I:

**Software and Software Engineering:** The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

### UNIT - II:

**Requirements Analysis And Specification:** Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

**Software Design:** Overview of the Design Process, How to Characterize of a Design, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

### UNIT – III:

**Function-Oriented Software Design:** Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, overview of Object Oriented design.

**User Interface Design:** Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

### UNIT - IV:

**Coding And Testing:** Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

## **UNIT - V:**

**Software Reliability And Quality Management:** Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

**Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

**Software Reuse:** what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level

### **Course Outcomes**

- i. Define and develop a software project from requirement gathering to implementation.
- ii. Obtain knowledge about principles and practices of software engineering.
- iii. Focus on the fundamentals of modelling a software project.
- iv. Obtain basic knowledge of coding
- v. Obtain knowledge about estimation maintenance and reuse of software systems.

### **Text Books:**

1. Software engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

### **References:**

1. Software Engineering : A Primer, Waman S Jawadkar, Tata McGraw-Hill, 2008
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
4. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

### **Web References:**

1. <https://nptel.ac.in/courses/106/105/106105182/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester		L	T	P	C
		3	0	0	3
<b>MACHINE LEARNING</b>					

### Course Objectives:

The objective of this course is to

- i. Introduce students to the basic concepts and techniques of Machine Learning.
- ii. Provide understanding of techniques, mathematical concepts, and algorithms used in machine learning to facilitate further study in this area.
- iii. Provide understanding of the limitations of various machine learning algorithms and the way to evaluate performance of machine learning algorithms.

### UNIT –I:

#### Introduction:

Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find -S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

### UNIT –II:

#### Decision Tree Learning:

Introduction, Decision Tree Representation, Decision tree learning algorithm, Inductive bias, Issues in Decision tree learning.

#### Evaluation Hypotheses:

Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

### UNIT –III:

#### Artificial Neural Networks:

Introduction, Neural network representation, Appropriate problems for Neural Network Learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks.

## **UNIT –IV:**

### **Bayesian Learning:**

Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm.

**Computational Learning Theory** – Sample Complexity for Finite, Hypothesis spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound Model of Learning.

## **UNIT –V:**

**Instance-Based Learning**– k-Nearest Neighbor Learning, Locally Weighted Regression, Radial basis function networks, Case-based learning.

**Genetic Algorithms** – an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithm.

**Reinforcement Learning** - The Learning Task, Q Learning.

### **Course Outcomes:**

On completion of this course, the students will be able to

- i. Recognize the characteristics of machine learning that make it useful to real-world problems.
- ii. Design decision tree to solve classification problems.
- iii. Design neural network to solve classification and function approximation problems.
- iv. Comprehend probabilistic methods for learning.
- v. Build optimal classifiers using genetic algorithms.

### **Text Books:**

1. Tom.M.Mitchell, Machine Learning, McGraw Hill International Edition

### **References:**

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer,2006
2. Duda, Hart and Stork, "Pattern Classification" (2nd ed.), Wiley Interscience,2000
3. EthernAlpaydin, Introduction to Machine Learning. Eastern Economy Edition, Prentice Hall of India,2005.
4. Elements of Statistical Learning, T. Hastie, R. Tibshirani and J. Friedman, Springer,2001.
5. Machine Learning: A Probabilistic Perspective, K. Murphy, MIT Press,2012.

### **Online Resources:**

1. AndrewNg,“MachineLearning”,StanfordUniversity<https://www.coursera.org/learn/machine-learning/home/info>
2. Sudeshna Sarkar, “Introduction to Machine Learning”, IIT Kharagpur.<https://nptel.ac.in/courses/106105152/1>
3. Prof. BalaramanRavindran, “Introduction to Machine Learning”,IITMadras.<https://nptel.ac.in/courses/106106139/1>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester		L	T	P	C
		3	0	0	3
CRYPTOGRAPHY & NETWORK SECURITY					

### Course Objective:

This course aims at training students to master the:

- The concepts of classical encryption techniques and concepts of finite fields and number theory
- Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
- Design issues and working principles of various authentication protocols and PKI standards
- Various secure communication standards including Kerberos, IPsec, SSL/TLS, S/MIME and PGP

### UNIT- I:

**Introduction to Security:** Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, a Model for Network Security

**Mathematics of Cryptography:** Algebraic Structures (Groups, Rings, Fields and Galois Fields), Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms

### UNIT- II:

**Classical Encryption Techniques:** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography

**Block Ciphers:** Traditional Block Cipher Structure, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles, Advanced Encryption Standard, AES Structure, AES Transformation Functions, AES Key Expansion, Multiple Encryption and Triple DES, Block Cipher Modes of Operation

### UNIT- III:

**Public-Key Cryptography:** Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Cryptography

**Cryptographic Hash Functions:** Applications of Cryptographic Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA)

**Message Authentication Codes:** Requirements for Message Authentication Codes, HMAC, CMAC



#### **UNIT- IV:**

**Digital Signatures:** Digital Signatures, Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme, NIST Digital Signature Algorithm, Elliptic Curve Digital Signature Algorithm

**Key Management and Distribution:** Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure

**User Authentication:** Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption:

#### **UNIT -V:**

**Transport-Level Security:** Web Security Considerations, Transport Layer Security, Secure Shell (SSH)

**Electronic Mail Security:** S/MIME, Pretty Good Privacy

**IP Security:** IP Security Overview, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange

#### **Course Outcomes:**

Upon completion of the course, it is expected that student will be able to:

- i. Identify information security goals and acquire fundamental knowledge on the concepts of finite fields and number theory
- ii. Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
- iii. Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
- iv. Apply different digital signature algorithms to achieve authentication and create secure applications
- v. Apply network security basics, analyze different attacks on networks and evaluate the performance of security protocols like SSL, IPsec, and PGP

#### **Text Book:**

1. Cryptography and Network Security, William Stallings, 8th Edition, Pearson Education

#### **References:**

1. Cryptography, Network Security and Cyber Laws, Bernard L. Menezes, Ravinder Kumar, Cengage Learning.
2. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyaya, 3rd Edition, Mc-GrawHill.
3. Network Security Illustrated, Jason Albanese, Wes Sonnenreich, McGrawHill.

**E-Resources:**

1. <https://nptel.ac.in/courses/106/105/106105031/> lecture by Dr. Debdeep Mukhopadhyay IIT Kharagpur [VideoLecture]
2. <https://nptel.ac.in/courses/106/105/106105162/lecture> by Dr. Sourav Mukhopadhyay IIT Kharagpur [VideoLecture]
3. <https://www.mitel.com/articles/web-communication-cryptography-and-network-securityweb> articles by Mitel PowerConnections



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester		L	T	P	C
		3	0	0	3
<b>DISTRIBUTED SYSTEMS</b>					

### Course Objectives:

- i. To understand the foundations of distributed systems.
- ii. To learn issues related to clock Synchronization, the need for global state and remote invocation in distributed systems.
- iii. To learn distributed mutual exclusion and deadlock detection algorithms.
- iv. To learn the characteristics of peer-to-peer, distributed shared memory systems and security.
- v. To understand the significance of agreement, distributed transactions, fault tolerance and recovery protocols in Distributed Systems.

### UNIT- I:

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges, Relation to Computer system Components, Motivation, Relation to Parallel Systems, Message-Passing systems versus Shared Memory systems, Primitives for Distributed Communication, Synchronous versus Asynchronous executions, Design issues and Challenges. **A model of Distributed Computations:** A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of Process Communications. **Logical Time:** A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP.

### UNIT –II:

**Message Ordering and Group Communication:** Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order.

**Global state and Snapshot Recording Algorithms:** Introduction, System model and definitions, Snapshot algorithms for FIFO channels. **Remote Invocation:** Introduction, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection, Remote Procedure Call, Events and Notifications, Case Study: JAVARMI.

### UNIT- III:

**Distributed Mutual Exclusion Algorithms:** Introduction, Preliminaries, Lamport's algorithm, Ricart-Agrawala algorithm, Maekawa's algorithm, Suzuki-Kasami's broadcast algorithm. **Deadlock Detection in Distributed Systems:** Introduction, System model, Preliminaries, Models of deadlocks, Knapp's Classification, Algorithms for the Single Resource Model, the AND model and the OR model.

#### **UNIT -IV:**

**Peer-to-Peer Computing and Overlay Graphs:** Introduction, Data indexing and overlays, Chord distributed hash table, Content addressable networks, Tapestry. **Distributed Shared Memory:** Abstraction and advantages, Memory consistency models, Shared Memory Mutual Exclusion.

**Security:** Introduction, Overview of Security Techniques, Cryptographic Algorithms, Digital Signatures, Cryptography Pragmatics.

#### **UNIT -V:**

**Distributed Transactions:** Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions. **Check Pointing and Rollback Recovery:** Introduction, Background and definitions, Issues in Failure recovery, Checkpoint-based recovery, Log-based rollback recovery, coordinated check pointing algorithm, Algorithms for asynchronous and synchronous check pointing and recovery. **Consensus and Agreement Algorithms:** Problem definition, Overview of results, Agreement in a Failure-Free system (synchronous or asynchronous).

#### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand the foundations and issues of distributed systems.
- ii. Illustrate the various synchronization issues, global state and remote invocation for distributed systems.
- iii. Develop the Mutual Exclusion and Deadlock detection algorithms in distributed systems.
- iv. Apply the features of peer-to-peer, distributed shared memory systems and security.
- v. Analyze the distributed transactions, agreement protocols and fault tolerance mechanisms in distributed systems.

#### **Text Books:**

1. Distributed computing: Principles, algorithms, and systems, Ajay D Kshemkalyani and Mukesh Singhal, Cambridge University Press, 2011.
2. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and Tim Kindberg, 5<sup>th</sup> Edition, Pearson Education, 2012.

#### **References:**

1. Distributed Operating Systems: Concepts and Design, Pradeep K Sinha, Prentice Hall of India, 2007.
2. Advanced concepts in operating systems. Mukesh Singhal and Niranjana G. Shivaratri, McGraw-Hill, 1994.
3. Distributed Systems: Principles and Paradigms, Tanenbaum A.S., Van Steen M., Pearson Education, 2007.

#### **E-Resources:**

1. <https://nptel.ac.in/courses/106/106/106106168/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester		L	T	P	C
		3	0	0	3
ADVANCED COMPUTER NETWORKS					

### Course Objectives:

- The course is aimed at providing basic understanding of Computer networks starting with OSI Reference Model, Protocols at different layers with special emphasis on IP, TCP & UDP and Routing algorithms.
- Some of the major topics which are included in this course are CSMA/CD, TCP/IP implementation, LANs/WANs, internetworking technologies, Routing and Addressing.
- Provide the mathematical background of routing protocols.
- Aim of this course is to develop some familiarity with current research problems and research methods in advance computer networks.

### UNIT-I

**Network Layer:** Network layer design issues: store and forward packet switching, services provided to transport layer, implementation of connectionless service, implementation of connection-oriented service, comparison of virtual circuit and datagram subnets.

**Routing algorithm:** Shortest path routing algorithm, flooding, distance vector routing, link state routing, hierarchical routing, broadcast routing, multicast routing, routing for mobile hosts, routing in adhoc networks.

Congestion control algorithms- load shedding, congestion control in datagram subnet.

### UNIT-II

**IPV4 Address:** Address space, notations, classful addressing, classless addressing, network address translation (NAT).

**IPV6 address:** structure address space,

Internetworking: need for network layer internet as a datagram, internet as a connection less network. IPV4 datagram, fragmentation, checksum, options. IPV6 advantages, packet format, extension headers, translation from IPV4 to IPV6.

### UNIT-III

**Process to Process delivery:** client/server paradigm, multiplexing and demultiplexing, connectionless versus connection-oriented services, reliable versus unreliable.

**UDP:** well known ports for UDP, user datagram, checksum, UDP operation, and uses of UDP.

**TCP:** TCP services, TCP features, segment, A TCP connection, flow control, error control, congestion control.

**SCTP:** SCTP services, SCTP features, packet format, an SCTP Association, flow control, error control

#### **UNIT-IV**

**Congestion control:** open loop congestion control, closed loop congestion control, congestion control in TCP, frame relay. **Quality of Service:** flow characteristics, flow cases. **Techniques to improve QOS:** scheduling, traffic shaping, resource reservation, admission control.

#### **UNIT-V**

**Domain Name System:** the name space, resource records, name servers.

E-mail: architecture and services, the user agent, message formats, message transfer, final delivery.

**WWW:** architecture overview, static web documents, dynamic web documents, hypertext transfer protocol, performance elements, the wireless web.

**Multimedia:** introduction of digital audio, audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, voice on demand, the Mbone-the multicast backbone.

#### **Course Outcomes:**

- i. Students should be understood and explore the basics of Computer Networks and Various Protocols.
- ii. Student will be able to understand the World Wide Web concepts.
- iii. Students will be able to administrate a network and flow of information further.
- iv. Student can easily understand the concepts of network security.
- v. Obtain the skills of subnetting and routing mechanisms.

#### **Text Books:**

1. Data Communications and Networking, 4<sup>th</sup> Edition, Behrouz A Fourzan, TMH.
2. Computer Networks, 4<sup>th</sup> Edition, Andrew S Tannenbaum, Perarson.
3. Comuter Networks, Mayank Dave, Cengage.

#### **References:**

1. [http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New\\_index1.html](http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New_index1.html)
2. <http://nptel.iitm.ac.in/video.php?subjectId=106105081>
3. [http://nptel.iitm.ac.in/courses/IIT-MADRAS/Computer\\_Networks/index.php](http://nptel.iitm.ac.in/courses/IIT-MADRAS/Computer_Networks/index.php)
4. Computer networks: A systems approach, 5<sup>th</sup> Edition, Larry L Peterson and Bruce S Davie, Elsevier.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester	Professional Elective - I	L	T	P	C
		3	0	0	3
HUMAN COMPUTER INTERACTION					

### Course Objectives:

- The main objective is to get student to think constructively and analytically about how to design and evaluate interactive technologies.

### UNIT I:

**Introduction:** Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession  
**Managing Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

### UNIT II:

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

### UNIT III:

**Command and Natural Languages:** Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing  
**Interaction Devices:** Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large.

### UNIT IV:

**Quality of Service:** Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences  
**Balancing Function and Fashion:** Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

### UNIT V:

#### User Documentation and Online Help:

Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process.

**Information Search:** Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

**Course Outcomes:**

- i. Explain the capabilities of both humans and computers from the viewpoint of human information processing.
- ii. Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
- iii. Apply an interactive design process and universal design principles to designing HCI systems.
- iv. Describe and use HCI design principles, standards, and guidelines.
- v. Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.

**Text Books:**

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design, 2/e, Wilbert O Galitz, Wiley DreamaTech.

**References:**

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester	Professional Elective Courses/ Job Oriented Elective	L	T	P	C
		2	0	2	3
<b>PROGRAMMABLE LOGIC CONTROLLERS AND APPLICATIONS</b>					

### Course Objectives:

The objectives of this course is to acquire knowledge to

- have knowledge on PLC.
- acquire the knowledge on programming of PLC.
- understand different PLC registers and their description.
- have knowledge on data handling functions of PLC.
- know how to handle analog signal and converting of A/D in PLC.

### UNIT- I:

#### Introduction

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

### UNIT-II:

#### PLC Programming

PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams and sequence listings, ladder diagram construction.

### UNIT- III:

#### Programmable Timers and Counters

Timer instructions – On delay time instruction – Off delay timer instruction – Retentive timer – Counter instructions – Up counter – Down counter – Cascading counters – Incremental encoder – Counter applications – Combining counter and timer functions.

### UNIT-IV:

#### Program Control Instructions

Master control reset instruction – Jump instructions and sub routines – Immediate input and output instructions.-Data manipulation – Data transfer operation – Data compare instruction – Data manipulation programs – Numerical data I/O interfaces – Math instructions – Addition, subtraction, multiplication & division instruction – Sequential instructions – Sequence programs – Shift registers – Word shift registers.

## **UNIT-V:**

### **Applications**

Control of water level indicator – Alarm monitor - Conveyor motor control – Parking garage – Ladder diagram for process control – PID controller.

### **Course Outcomes:**

The students are able to:

- i. know the PLCs and their I/O modules.
- ii. develop control algorithms to PLC using ladder logic.
- iii. manage PLC registers for effective utilization in different applications.
- iv. design PID controller with PLC.
- v. handle analog signal and converting of A/D in PLC

### **Text Books:**

1. Programmable logic controllers by Frank D.Petruzella- McGraw Hill – 3<sup>rd</sup> Edition.
2. Programmable Logic Controllers – Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI

### **References:**

1. Programmable Logic Controllers – Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. – Pearson, 2004.
2. Introduction to Programmable Logic Controllers- Gary Dunning-CengageLearning. Programmable Logic Controllers –W.Bolton-Elsevier publisher



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester	Professional Elective Courses/ Job Oriented Elective	L	T	P	C
		2	0	2	3
<b>MOBILE APPLICATION DEVELOPMENT</b>					

### Course Objectives:

- i. To demonstrate the introduction and characteristics of mobile applications
- ii. Application models of mobile application frameworks. Managing application data and User-interface design for mobile applications Integrating networking, the OS and hardware into mobile-applications.
- iii. Addressing enterprise requirements in mobile applications – performance, scalability, modifiability, availability, and security.
- iv. Testing methodologies for mobile applications– Publishing, deployment, maintenance and management. To demonstrate their skills of using Android software development tools
- v. To demonstrate their ability to deploy software to mobile devices

### UNIT- I

**Fundamental concepts in Text and Image:** Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

### UNIT- II

**Fundamental concepts in video and digital audio:** Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization, and transmission of audio.

### UNIT- III

**Action Script I:** ActionScript Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an ActionScript Class

**Action Script II:** Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces, Packages, Exceptions

### UNIT- IV

**Application Development:** An OOP Application Framework, Using Components with ActionScript MovieClip Subclasses.

## **UNIT- V**

**Multimedia data compression:** Lossless compression algorithm: RunLength Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

**Basic Video Compression Techniques:** Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

### **Course Outcomes:**

Upon completion of the course students should be able to:

- i. Install and configure Android application development tools.
- ii. Design and develop user Interfaces for the Android platform.
- iii. Use state information across important operating system events.
- iv. Apply Java programming concepts to Android application development.
- v. Ability to evaluate and select appropriate solutions to the mobile computing platform.

### **Text Books:**

1. Ze-Nian Li and Mark S.Drew: Fundamentals of Multimedia,1st Edition, PHI/Pearson Education, 2004.
2. Colin Moock: Essential ActionScript 2.0, 1st Edition, SPD O, REILLY,2004

### **References:**

1. Nigel Chapman and Jenny Chapman : Digital Multimedia , 3rd Edition, Wiley Dreamtech, 2009
2. David Vogeeler, Mathew Pizzi : Macromedia Flash Mx Professional, 1 st Edition, Publication 2004.
3. Steve Heath: Multimedia and communications technology, 2nd Edition, Elsevier(Focal Press), 1999.
4. Steinmetz, Ralf, Nahrstedt : Multimedia Applications, 1st Edition, Springer, 2004
5. Weixel: Multimedia Basics, 2nd Edition, Thomson Press, 2006.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester	Professional Elective Courses/ Job Oriented Elective	L	T	P	C
		2	0	2	3
NoSQL DATABASES					

### Course Objectives:

The objective of this course is to

- Explore the emergence, requirements, and benefits of a NoSQL database.
- Understand the basic architecture and data models of a NoSQL database (key-value stores, document databases, column-family stores, graph databases).

### UNIT-I:

#### Introduction and Basic Concepts:

Overview, and History of NoSQL Databases, Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points, Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases.

### UNIT-II:

#### NoSQL Key/Value databases using MongoDB:

**Document** Databases, What Is a Document Database? Features, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

### UNIT-III:

#### Column-oriented NoSQL databases using Apache HBASE:

Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use.

#### **UNIT-IV:**

##### **NoSQL Key/Value databases using Riak:**

Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets.

#### **UNIT-V:**

##### **Graph NoSQL databases using Neo4:**

NoSQL database development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use.

#### **Course Outcomes:**

On completion of this course, the students will be able to

- i. Differentiate between various non-relational (NoSQL) database.
- ii. Create Document-oriented NoSQL databases using MongoDB.
- iii. Create Column-oriented NoSQL databases using Apache HBASE.
- iv. Create NoSQL Key/Value databases using Riak.
- v. Create Graph NoSQL databases using Neo4.

#### **Text Books:**

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pramod J. Sadalage, Martin Fowler, Pearson Education, 2013.
2. Shashank Tiwari. Professional NoSQL. John Wiley and Sons. ISBN:978-0-470-94224-6.

#### **References:**

1. A Guide to Modern Databases and the NoSQL Movement Edition, Redmond, E. & Wilson
2. Redmond, E. & Wilson, J. (2012). Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement (1<sup>st</sup> Ed.). Raleigh, NC: The Pragmatic Programmers, LLC.
3. Dan Sullivan. NoSQL for Mere Mortals. Addison-Wesley Professional. 2015.
4. Guy Harrison. Next-Generation Databases. Apress. 2016.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester		L	T	P	C
		0	0	3	1.5
SOFTWARE ENGINEERING LAB					

### Course Objectives:

- i. To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

### List of Experiments

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:

- 1) Use IIT KGP Software Engineering Virtual Lab for Full Product Development
- 2) Development of problem statement.
- 3) Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
- 4) Preparation of Software Configuration Management and Risk Management related documents.
- 5) Study and usage of any Design phase CASE tool
- 6) Performing the Design by using any Design phase CASE tools.
- 7) Develop test cases for unit testing and integration testing
- 8) Develop test cases for various white box and black box testing techniques.

### Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

### Course Outcomes:

- i. Become acquainted with historical and modern software methodologies
- ii. Understand the phases of software projects and practice the activities of each phase
- iii. Able to apply Practice clean coding
- iv. Analysis and apply to take part in project management
- v. Become adept at such skills as distributed version control, unit testing, integration testing, build management, and deployment

**Text Books:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester		L	T	P	C
		0	0	3	1.5
<b>MACHINE LEARNING LAB</b>					

### Course Objectives:

This course will enable students to

- i. To learn and understand different Data sets in implementing the machine learning algorithms.
- ii. Implement the machine learning concepts and algorithms in any suitable language of choice.

### Syllabus:

- WEEK 1: End-to-end machine learning project on scikit-learn
- WEEK 2: End-to-end machine learning project on scikit-learn (Continued)
- WEEK 3: Regression on scikit-learn - Linear regression Gradient descent - batch and stochastic.
- WEEK 4: Polynomial regression, Regularized models
- WEEK 5: Logistic regression
- WEEK 6: Classification on scikit-learn - Binary classifier
- WEEK 7: Classification on scikit-learn - Multiclass classifier
- WEEK 8: Support Vector Machines using scikit-learn
- WEEK 9: Decision Trees, Ensemble Learning and Random Forests
- WEEK 10: Decision Trees, Ensemble Learning and Random Forests (Continued)
- WEEK 11: Neural networks models in scikit-learn
- WEEK 12: Unsupervised learning

**Course Outcomes:** At the end of the course, student will be able to

- i. Understand the life cycle of a machine learning project - typical steps involved and tools that can be used in each step.
- ii. Using machine learning algorithms to solve practical problems using libraries like scikit-learn and tensorflow.
- iii. Fine tuning the algorithms through regularization, feature selection, and better models.
- iv. Develop an understanding of evaluation of machine learning algorithms and decide the next steps based on the analysis.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester		L	T	P	C
		0	0	3	1.5
CRYPTOGRAPHY & NETWORK SECURITY LAB					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- Describe the enhancements made to IPv4 by IPSec.
- Understanding the fundamental ideas of public-key cryptography.
- Understanding the Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers), Public-key cryptography (RSA, discrete logarithms).

### List of experiments

1. Implement the following ciphers using C programming:

- Caesar Cipher
- Playfair Cipher
- Hill Cipher
- Vigenere Cipher
- Rail fence – row & Column Transformation

2. Observe the working of following algorithms using Cryptool:

- DES
- Triple DES
- AES
- RSA
- Diffie-Hellman
- ECC
- ElGamal
- MD5
- SHA-1

Digital Signature

3. Using C programs implement shared key generation on two hosts using Diffie-Hellman key exchange.

4. Using hmac and hashlib modules implement a Python program for computing message digest for a given file and validate it.

5. Using bWapp tool, demonstrate SQL injection and Cross Site Scripting vulnerability exploitation.

6. Using packet sniffers extract a 5-minute log of traffic in the network, and give a statistical report on it.

7. Using secrets module, develop a Python program that generates a strong password. Find quality of the generated password using Cryptool.

**Course Outcomes:**

The students should be able to:

- i. Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- ii. Ability to identify information system requirements for both of them such as client and server.
- iii. Ability to understand the current legal issues towards information security.
- iv. Understanding about Encrypt and decrypt messages using block ciphers.
- v. Determination computer and network security fundamental concepts and principles.

**Text Books:**

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

**References:**

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester	Skill Advanced Course/Soft Skill Course	L	T	P	C
		1	0	2	2
ADVANCED COMMUNICATION SKILLS LAB					

### Course Objectives:

The objectives of this course are:

- i. To enable the students, develop advanced communication skills in English for academic and social purposes.
- ii. To make the students to understand the significance of group discussion and various modalities of a group discussion.
- iii. To make the students to excel in opinion giving and argue confidently and logically during Debates.
- iv. To expose the students to the nuances involved in oral presentation skills and Public Speaking skills.
- v. To train the students in job interviews by exposing them to the prerequisites, types, FAQ's and various preparatory techniques in job interviews.

**UNIT - I: JAM:** Do's and Don'ts of JAM, speaking practice with various topics

**UNIT - II: Group Discussion:** Importance, modalities, types, do's and don'ts of a GD

**UNIT - III: Debate:** Importance of a Debate, General rules for participation in debate, Useful phrases, Sample Debates-Activities

**UNIT - IV: Oral Presentation & public Speaking:**

- Make Effective presentations using posters, Flash cards and PPTs
- Tips for making a presentation
- Dos and Don'ts of a presentation
- Dealing with nerves
- Simulated topics/situations for public speaking

**UNIT - V: Interview Skills:**

- Significance of job interviews
- Understanding preparatory techniques for job interviews
- Know and answer frequently asked questions (FAQs) at job interviews
- Mock interviews

**Course Outcomes:**

The students should be able to:

- i. Improve their speaking ability by using context -specific vocabulary.
- ii. Learn how to communicate in a group discussion confidently and fluently by using appropriate expressions.
- iii. Expose the learners to various speaking activities and enable them to argue logically and develop critical thinking skills.
- iv. Apply various techniques for making effective oral presentation skills and improve public speaking skills.
- v. acquire employability skills by integrating communication skills and to excel in job interviews

**References:**

1. Effective Technical Communication | 2nd Edition Paperback – 27 July 2017.  
by M. Ashraf Rizvi (Author).
2. Sanjay Kumar and Pushp Lata. —Communications Skills|. Oxford University. Press. 2011.
3. Video /you tube links:
4. MunibaMazari, Malala Yousuf Zahi, Abdul Kalam, Steve Jobs, Mark Zuckerberg...



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester	Mandatory Course (AICTE)	L	T	P	C
		2	0	0	0
INTELLECTUAL PROPERTY RIGHTS AND PATENTS					

### Course Objectives:

- This course is aimed at familiarizing researchers with the nuances of Intellectual Property Rights (IPR) to help them integrate the IPR process in their research activities.
- IPR internalisation process to help the researchers to set targeted objectives in their research project and to design and implement their research to clearly differentiate their work vis-a-vis the existing state of knowledge/ prior art.
- To give the PhD Students “hands- on –training” in literature, including patent search and documentation of research activities that would aid an IPR expert to draft, apply and prosecute IPR applications.
- To make the PhD students familiar with basics of IPR and their implications in Research, development, and commercialization.
- Facilitate the students to explore career options in IPR.

### Unit I: Introduction to Intellectual Property Rights (IPR)

Introduction of IPR - Importance - Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

### Unit II: Copyrights and Neighboring Rights

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

### UNIT III: Patents

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

#### **UNIT IV: Trademarks**

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

#### **UNIT V: Trade Secrets & Cyber Law and Cyber Crime**

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions – E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

#### **Course Outcomes:**

- i. IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
- ii. Student gets an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.
- iii. Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems and analyse the social impact of intellectual property law and policy
- iv. Analyse ethical and professional issues which arise in the intellectual property law context
- v. Students should be able to write reports on project work and critical reflect on their own learning.

#### **TextBooks**

1. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
2. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
3. Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

#### **References:**

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
5. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester		L	T	P	C
		3	0	0	3
UNIFIED MODELLING LANGUAGE&DESIGN PATTERNS					

### Course Objectives:

- Introducing the Unified Process and showing how UML can be used within the process.
- Presenting a comparison of the major UML tools for industrial-strength development.
- Demonstration of patterns related to object-oriented design.
- Describe the design patterns that are common in software applications.
- Analyze a software development problem and express it.

### UNIT-I:

**Introduction to UML:** Why we Model, Importance of modeling, Principles of modeling, Object-oriented modeling, Conceptual model of the UML, Architecture, Software Development Life Cycle.  
**Structural Modeling:** Classes, Relationships, Common Mechanisms, and Diagrams, Advanced classes, advanced relationships, Object diagrams: Common modeling techniques.

### UNIT-II:

**Basic Behavioral Modeling:** Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams, Common modeling techniques for Interaction diagrams, Use case diagrams and Activity diagrams.

**Advanced Behavioral Modeling:** Events and Signals, State machines, Processes and Threads, Time and Space, State chart diagrams with Common modeling techniques.

**Architectural Modeling:** Component, Deployment, Component diagrams and Deployment diagrams. Common modeling techniques for Component and Deployment diagrams. Case Study: The Unified Library application.

### UNIT-III:

**Introduction:** What is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

### UNIT-IV:

**Creational Patterns:** Abstract Factory, Builder, Factory Method, Prototype, Singleton.

**Structural Pattern:** Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy.



## **UNIT-V:**

**Behavioral Patterns:** Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, Strategy, Template Method, What to expect from Design Patterns.

### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Ability to find solutions to the complex problems using UML Approach.
- ii. Understand design principles of behavioral modeling and architectural modeling.
- iii. Distinguish between different categories of design patterns.
- iv. Analyze and apply appropriate patterns for design of given problem.
- v. Design and develop the software using Pattern Oriented Architectures.

### **Text Books:**

1. “The Unified Modeling Language User Guide”, Grady Booch, James Rumbaugh,
2. Ivar Jacobson, 12th Impression, 2012, PEARSON.
3. Design Patterns by Erich Gamma, Pearson Education.
4. “Object- Oriented Analysis And Design with Applications”, Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON.

### **References:**

1. “The Unified modeling language Reference manual”, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley.
2. “Object-oriented analysis and design with the Unified process”, John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning.
3. Patterns in JAVA Vol-I (or) Vol-II By Mark Grand, Wiley DreamTech.
4. Java Enterprise Design Patterns Vol-III By Mark Grand Wiley DreamTech.
6. “Head first object-oriented analysis and design”, Brett D. McLaughlin, Gary Pollice, Dave West, O’Reilly.
7. “Object-oriented analysis and design using UML”, Mahesh P. Matha, PHI.

### **E-Resources:**

1. <https://nptel.ac.in/courses/106/105/106105224/>
2. [https://www.tutorialspoint.com/design\\_pattern/design\\_pattern\\_quick\\_guide.htm](https://www.tutorialspoint.com/design_pattern/design_pattern_quick_guide.htm)



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	Professional Elective-IV	L	T	P	C
		3	0	0	3
SOFTWARE TESTING METHODOLOGIES					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- Describe the principles and procedures for designing testcases.
- Provide supports to debugging methods.
- Acts as the reference for software testing techniques and strategies.

### UNIT-I:

**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. **FLOW GRAPHS AND PATH TESTING:** Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

### UNIT-II:

**Transaction Flows Testing:** Transaction Flows, Transaction Flow Testing Techniques.

**Dataflow Testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

### UNIT-III:

#### Paths, Path Products and Regular Expressions:

Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

**Syntax Testing:** Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips.

**Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

### UNIT-IV:

**State, State Graphs And Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

#### Graph Matrices and Application:

Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

## **UNIT-V:**

**Software Testing Tools:** Introduction to Testing, Automated Testing, Concepts of TestAutomation,IntroductiontolistoftoolslikeWin Runner,LoadRunner,Jmeter,Selenium. About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

### **Course Outcomes:**

The students should be able to:

- i. Define Software testing terminology and methodology
- ii. Discuss and classify various testing techniques for conducting different types of software testing
- iii. Apply different software testing techniques.
- iv. Construct test cases by understanding test suite management and software quality management.
- v. Demonstrate modern software testing tools and testing of Object-Oriented Software and Web based software

### **Text Books:**

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Cambridge

### **References:**

1. The Craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann & J. Offutt, Cambridge Univ. Press.
5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
6. Software Testing Concepts and Tools, P.Nageswara Rao, dreamtech Press
7. Win Runner in simple steps by Hakeem Shittu, Genixpress, 2007.
8. Foundations of Software Testing, D.Graham & Others, Cengage Learning.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	Professional Elective-III	L	T	P	C
		3	0	0	3
SOFTWARE PROJECT MANAGEMENT					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- To study how to plan and manage projects at each stage of the software development life cycle(SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project managementprocess.
- To understand successful software projects that support organization's strategicgoals.

### UNIT-I:

**Conventional Software Management:** The Waterfall Model, Conventional Software Management Performance.

**Evolution Of Software Economics:** Software Economics, Pragmatic Software CostEstimation.

**Improving Software Economics:** Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation through Software Economics.

### UNIT-II:

**The Old Way and the New:** The Principles of Conventional Software Engineering, The Principles of Modern Software Management, Transitioning to an Iterative Process.

**Life Cycle Phases:** Engineering and Production Stages, Inception Phase, Elaboration Phase, Construction Phase, Transition Phase.

### UNIT-III:

**Model Based Software Architectures:** A Management Perspective, A Technical Perspective.

**Workflows of the Process:** Software Process Workflows, Iteration Workflows.

**Iterative Process Planning:** Work Breakdown Structures, Planning Guidelines, The Cost and Schedule Estimating Process, The Iteration Planning Process.

### UNIT-IV:

**Project Organization and Responsibilities:** Line-Of-Business Organizations, Project Organizations, Evolution of Organizations.

**Project Control and Process Instrumentation:** The Seven Core Metrics, Management Indicators, Quality Indicators Modern Project Profiles. The COCOMO Cost Estimation Model: COCOMO.

## **UNIT-V:**

**Effort Estimation and Scheduling:** Effort Estimation, Scheduling.

**Quality Planning:** Quality Concepts, Quantitative Quality Management Planning. **RISK MANAGEMENT:** Risk Assessment, Risk Control.

### **Course Outcomes:**

The students should be able to:

- i. Estimate overall cost of a software project.
- ii. Explain software development process.
- iii. Distinguish workflows of process.
- iv. Design project organization structure & analyze quality.
- v. Estimate effort and schedule needed for project.

### **Text Books:**

1. Walker Royce, “Software Project Management – A Unified Framework”, 1st Edition, Pearson Education, 2002.
2. Pankaj Jalote, “Software Project Management in Practice”, 1st Edition, Pearson Education, 2005.
3. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill.

### **References:**

1. Bob Hughes, “Mike Cotterell, Rajib Mall, Software Project Management”, 5th Edition, McGraw-Hill Higher Education, 2011.
2. Joel Henry, “Software Project Management”, 1st Edition, Pearson Education, 2006.
3. Norman E. Fenton, Shari Lawrence Pfleeger, “Software Metrics: A Rigorous and Practical Approach”, 1st Edition, PWS Publishing Company, 1997



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

III Year-II Semester	Professional Elective – V	L	T	P	C
		3	0	0	3
BIG DATA ANALYTICS					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- i. Necessity of Big data analysis and challenges in Big data analysis
- ii. Descriptive, Predictive, Relatime analysis of bigdata
- iii. Programming tools PIG & HIVE in Hadoop echosystem

**UNIT-I:Introduction:** Introduction to big data: Introduction to Big Data platform, Challenges of conventional systems, Intelligent data analysis, Nature of data, Analytic processes and tools, Analysis vsReporting.

**UNIT - II: Stream Processing:** Mining data streams: Introduction to Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Oneness in a Window, Decaying Window, Real time Analytics Platform (RTAP) Applications, Case Studies - Real Time Sentiment Analysis - Stock Market Predictions.

**UNIT - III: Introduction to Hadoop:** Hadoop: History of Hadoop, the Hadoop Distributed File System, Components of Hadoop Analysing the Data with Hadoop, Scaling Out, Hadoop Streaming, Design of HDFS, Java interfaces to HDFS Basics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run, Failures, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features Hadoop environment.

**UNIT - IV: Frameworks and Applications:** Frameworks: Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, fundamentals of HBase and ZooKeeper.

**UNIT - V: Predictive Analytics and Visualizations:** Predictive Analytics, Simple linear regression, Multiple linear Regressions, Interpretation of regression coefficients, Visualizations, Visual data analysis techniques, interaction techniques, Systems and application

**Course Outcomes:**

The students should be able to:

- i. Understand and Illustrate characteristics of big data and big data challenges in different domains including social media, transportation, finance and medicine
- ii. Demonstrate stream processing on real time applications
- iii. Do Big data processing using Map reduce on Hadoop
- iv. Do Big data processing using PIG scripts and HiveQL queries
- v. Understand Predictive analysis of big data.

**Text Books:**

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'reilly Media, Fourth Edition, 2015.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.
3. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP, 2012

**References:**

1. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
2. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, "Harness the Power of Big Data: The IBM Big Data Platform", Tata McGraw Hill Publications, 2012.
3. Arshdeep Bahga and Vijay Madisetti, "Big Data Science & Analytics: A Hands On Approach", VPT, 2016.
4. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons, 2014.

**E-resources:**

1. <https://www.edx.org/course/big-data-fundamentals>
2. <https://hadoop.apache.org/>
3. <https://pig.apache.org/>
4. <https://hive.apache.org/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year – I Semester		L	T	P	C
		3	0	0	3
ADVANCED COMPUTER ARCHITECTURE					

### Course Objectives:

- To understand the concept of Parallel Processing and its applications.
- Implement the Hardware for Arithmetic Operations.
- Analyze the performance of different scalar Computers.
- To learn the Pipelining Concept for a given set of Instructions.
- Distinguish the performance of pipelining and non-pipelining environment in a processor.

### UNIT -I:

**Fundamentals of Computer Design:** Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl's law. **Instruction Set Principles and Examples:** Introduction, Classifying instruction set- Memory addressing- type and size of operands, Operations in the instruction set.

### UNIT -II:

**Pipelines:** Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties. **Memory Hierarchy Design:** Introduction, Review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

### UNIT -III:

**Instruction Level Parallelism the Hardware Approach:** Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- Hardware based speculation.

### UNIT -IV:

**ILP Software:** Approach Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware versus Software. **The Processor:** Introduction, Logic Design Conventions, Building a Datapath, A Simple Implementation Scheme, An Overview of Pipelining, Pipelined Datapath and Control, **Data Hazards:** Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, The ARM Cortex-A8 and Intel Core i7 Pipelines.



## **UNIT –V:**

**Multi Processors and Thread level Parallelism-** Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization, **Inter Connection and Networks:** Introduction, Interconnection network media, Practical issues in interconnecting networks, Static and Dynamic Networks, Linear Array, Ring, Star, Tree, Mesh, Systolic Array, Chordal ring, Completely connected network, Cube connected cycles, Torus, K-ary-n cube, Barrel shifter, Single stage interconnection network, Multistage Interconnection Networks, Control Structure, Node degree, Diameter, Bisection width, Symmetric, Functionality, Network Latency, Bandwidth, Scalability, Cluster, Designing of clusters.

**Intel Architecture:** Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

### **Course Outcomes:**

After the completion of the course, student will be able to

- i. Understand the types of computers, and new trends and developments in computer architecture.
- ii. Develop pipelining, instruction set architectures, memory addressing.
- iii. Apply ILP using dynamic scheduling, multiple issue, and speculation.
- iv. Analyze the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges.
- v. Determine the importance of multithreading by using ILP and supporting thread-level parallelism (TLP).

### **Text Books:**

1. Computer Organization and Design: The hardware and Software Interface, David A Patterson, John L Hennessy, 5<sup>th</sup> edition, MK.
2. Computer Architecture and Parallel Processing – Kai Hwang, Faye A. Brigs, McGraw Hill.
3. John L. Hennessy, David A. Patterson – Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

### **References:**

1. Modern Processor Design: Fundamentals of Super Scalar Processors, John P. Shen and Miikko H. Lipasti, Mc Graw Hill.
2. Advanced Computer Architecture – A Design Space Approach – Dezsó Sima, Terence Fountain, Peter Kacsuk, Pearson.
3. Computer Architecture and Parallel Processing – Kai Hwang, Faye A. Brigs., MC Graw Hill.
4. Introduction to Parallel Computing, 2nd Edition, Pearson Education by Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar.

### **E-Resources:**

1. <https://nptel.ac.in/courses/106/105/106105163/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	Professional Elective – V	L	T	P	C
		3	0	0	3
BLOCK CHAIN TECHNOLOGIES					

### Course Objective:

- To provide conceptual understanding of the function of Blockchain as a method of securing distributed ledgers.
- To understand the structure of a Blockchain and why/when it is better than a simple distributed database
- To make students understand the technological underpinnings of Blockchain operations as distributed data structures and decision making systems.
- To understand a “smart” contract and its legal implications.

### UNIT-I:

**Introduction:** History and basics, Types of Blockchain, Consensus, CAP Theorem.

**Cryptographic Hash Functions:** Properties of hash functions, Secure Hash Algorithm, Merkle trees, Patricia trees.

### UNIT-II:

**Decentralization:** Decentralization using Blockchain, Methods of decentralization, decentralization framework, Blockchain and full ecosystem decentralization, Smart contracts, Decentralized Organizations, Platforms for decentralization.

### UNIT-III:

**Bitcoin:** Introduction to Bitcoin, Digital keys and addresses, Transactions, Blockchain, The Bitcoin network, Bitcoin payments, Bitcoin Clients and APIs, Alternatives to Proof of Work, Bitcoin limitations.

### UNIT-IV:

**Ethereum:** Smart Contracts, Introduction to Ethereum, The Ethereum network, Components of the Ethereum ecosystem, Blocks and Blockchain, Fee schedule, Ethereum Development Environment, Solidity.

### UNIT-V:

**Hyperledger:** Introduction, Hyperledger Projects, Protocol, Architecture, Hyperledger Fabric, Sawtooth Lake, Corda.

**Challenges and Opportunities:** Scalability, Privacy, Blockchain for IoT, Emerging trends

## **Course Outcomes**

Upon completion of the course, it is expected that student will be able to:

- i. Define and explain the fundamentals of Blockchain.
- ii. Understand decentralization and the role of Blockchain init.
- iii. Understand and analyze Bitcoin Cryptocurrency and underlying Blockchain network.
- iv. Understand Ethereum currency and platform, and develop applications using Solidity.
- v. Understand Hyperledger project and its components; critically analyze the challenges and future opportunities in Blockchain technology.

## **Text Book:**

1. Mastering Blockchain, Imran Bashir, Second Edition, Packt Publishing.

## **References:**

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas Antonopoulos, O'Reilly.
2. Blockchain Blueprint for a New Economy, Melanie Swan, O'Reilly.
3. Mastering Bitcoin: Programming the Open Blockchain, Antonopoulos, Andreas M. O'Reilly.
4. Blockchain Technology: Cryptocurrency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester		L	T	P	C
		3	0	0	3
<b>CLOUD COMPUTING</b>					

### Course Objective:

- i. To understand the concept of cloud computing.
- ii. To appreciate the evolution of cloud from the existing technologies.
- iii. To have knowledge on the various issues in cloud computing.
- iv. To be familiar with the lead players in cloud.
- v. To appreciate the emergence of cloud as the next generation computing paradigm.

### UNIT-I:

**Introduction:** Introduction to Cloud Computing, Definition of Cloud, Evolution of Cloud Computing, Underlying Principles of Parallel and Distributed Computing, Cloud Characteristics, Elasticity in Cloud – On-Demand Provisioning.

### UNIT-II:

**Cloud Enabling Technologies:** Service Oriented Architecture, REST and Systems of Systems, Web Services, Publish-Subscribe Model, Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices, Virtualization Support and Disaster Recovery.

### UNIT-III:

**Cloud Architecture, Services And Storage:** Layered Cloud Architecture Design, NIST Cloud Computing Reference Architecture, Public, Private and Hybrid Clouds, IaaS, PaaS, SaaS, Architectural Design Challenges, Cloud Storage, Storage-as-a-Service, Advantages of Cloud Storage, Cloud Storage Providers, S3.

### UNIT-IV:

**Resource Management And Security In Cloud:** Inter Cloud Resource Management, Resource Provisioning and Resource Provisioning Methods, Global Exchange of Cloud Resources, Security Overview, Cloud Security Challenges, Software-as-a-Service Security, Security Governance, Virtual Machine Security, IAM, Security Standards.

## **UNIT-V:**

**Cloud Technologies And Advancements:** Hadoop, MapReduce, Virtual Box, Google App Engine, Programming Environment for Google App Engine, Open Stack, Federation in the Cloud, Four Levels of Federation, Federated Services and Applications, Future of Federation.

### **Course Outcomes:**

Upon completion of the course, it is expected that student will be able to:

- i. Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- ii. Learn the key and enabling technologies that help in the development of cloud.
- iii. Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- iv. Explain the core issues of cloud computing such as resource management and security.
- v. Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

### **Text Books:**

1. Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, Morgan Kaufmann Publishers.
2. Cloud Computing: Implementation, Management and Security, Rittinghouse, John W., and James F. Ransome, CRC Press.

### **References:**

1. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Tata McgrawHill.
2. Cloud Computing - A Practical Approach, Toby Velte, Anthony Velte, Robert Elsenpeter, Tata McGrawHill.
3. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), George Reese, O'Reilly.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3
CYBER LAWS					

### Course Objectives:

- The Objectives of This Course is to Enable Learner To Understand, Explore, and Acquire a Critical Understanding Cyber Law.
- Student learns and develops Competencies for Dealing with Frauds and Deceptions (Confidence Tricks, Scams) And Other Cyber Crimes for Example, Child Pornography Etc. That Are Taking Place Via the Internet.
- Student should learn security policies and procedures.

**UNIT-I: Introduction to Computer Security-** Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International securityactivity.

**UNIT-II: Secure System Planning and administration-** Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, and Network Security, The Redbook and Government networkevaluations.

**UNIT-III: Information security policies and procedures-**Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies- asset classification policy- developingstandards.

**UNIT-IV: Information security-fundamentals-**Employee responsibilities- information classification- Information handling- Tools of information security- Information processing-secure program administration.

**UNIT-V: Organizational and Human Security-**Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals, IT Act- Structure of IT Act, Common cyber crime scenarios and Applicability of Legal sections, Case studies as per selected IT Act sections.

**Course Outcomes:** At the end of the course, student will be able to

- i. Explain the Social and Intellectual Property Issues Emerging From ‘Cyberspace.
- ii. Explore The Legal and Policy Developments in Various Countries to Regulate Cyberspace
- iii. Develop The Understanding of Relationship Between Commerce and Cyberspace.
- iv. Determine in Depth Knowledge of Information Technology Act and Legal Framework of Right To Privacy, Data Security And Data Protection.
- v. Apply various Case Studies on Real Time Crimes.

**References:**

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O’ Reilly Media, 2006.
2. Thomas R. Peltier, Information Security policies and procedures: A Practitioner’s Reference, 2nd Edition Prentice Hall, 2004.
3. Kenneth J. Knapp, Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions, IGI Global, 2009.

**Web References:**

1. <https://meity.gov.in/content/information-technology-act-2000>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	PROFESSIONAL ELECTIVE COURSES	L	T	P	C
		3	0	0	3
SOFT COMPUTING					

### Course Objectives:

- The main objective of the Soft Computing Techniques to Improve Data Analysis Solutions is to strengthen the dialogue between the statistics and soft computing research communities to cross-pollinate both fields and generate mutual improvement activities. Soft Computing is a consortium of methodologies which collectively provide a body of concepts and techniques for designing intelligent systems.

### UNIT-I:

**Introduction:** What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

### UNIT-II:

**Neural Networks:** What is Neural Network, Learning rules and various activation functions, Single layer Perceptrons, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Backpropagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications

### UNIT-III:

**Fuzzy Systems:** Fuzzy Set theory, Fuzzy versus Crisp set, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Predicate logic, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification

### UNIT-IV:

**Genetic Algorithm:** History of Genetic Algorithms (GA), Working Principle, Various Encoding methods, Fitness function, GA Operators- Reproduction, Crossover, Mutation, Convergence of GA, Bit wise operation in GA, Multi-level Optimization.

### UNIT-V:

**Hybrid Systems:** Sequential Hybrid Systems, Auxiliary Hybrid Systems, Embedded Hybrid Systems, Neuro-Fuzzy Hybrid Systems, Neuro-Genetic Hybrid Systems, Fuzzy-Genetic Hybrid Systems.



**GA based Backpropagation Networks:** GA based Weight Determination, K - factor determination in Columns.

**Fuzzy Backpropagation Networks:** LR type Fuzzy numbers, Fuzzy Neuron, Fuzzy BP Architecture, Learning in Fuzzy BP, Application of Fuzzy BP Networks.

**Course Outcomes:**

- i. Student can be able to build intelligent systems through soft computing techniques.
- ii. Student should be able to understand the concept of artificial neural networks, fuzzy arithmetic, and fuzzy logic with their day-to-day applications.
- iii. Understand fuzzy logic and reasoning to handle and solve engineering problems.
- iv. Perform various operations of genetic algorithms, Rough Sets.
- v. Comprehend various techniques to build model for various applications

**Text Books:**

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007.
2. Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva, Pearson Edition, 2004.

**References:**

1. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran, G. A. Vijayalakshami, PHI.
2. Genetic Algorithms: Search and Optimization, E. Goldberg.
3. Neuro-Fuzzy Systems, Chin Teng Lin, C. S. George Lee, PHI.
4. Build\_Neural\_Network\_With\_MS\_Excel\_sample by Joe choong



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	PROFESSIONAL ELECTIVE COURSES	L	T	P	C
		2	0	2	3
ETHICAL HACKING					

### Course Objectives:

- To teach students how to think like a hacker
- To provide a deep understanding of security issues and concerns.
- To Provide the students with specialist knowledge and experience of advanced hacking techniques and their countermeasures.

### UNIT-I:

**Introduction:** Understanding the importance of security, Concept of ethical hacking and essential Terminologies-Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit. Phases involved in hacking, Foot printing, Scanning, System Hacking, Session Hijacking.

### UNIT-II:

**Buffer Overflows:** Significance of Buffer Overflow Vulnerability, Why Programs/Applications are vulnerable. Reasons for Buffer Overflow Attacks. Methods of ensuring that buffer overflows are trapped.

### UNIT-III:

**Sniffers:** Active and passive sniffing. ARP poisoning and countermeasures. Man in the middle attacks, Spoofing and Sniffing attacks. Sniffing countermeasures.

### UNIT-IV:

**SQL Injection:** Attacking SQL Servers, Sniffing, Brute Forcing and finding Application Configuration Files, Input validation attacks. Preventive Measures. Web Application Threats, Web Application Hacking, Cross Site Scripting / XSS Flaws / Countermeasures Correct Web Application Set-up.

### UNIT-V:

**Web Application Security:** Core Defence Mechanisms. Handling User Access, Authentication, Session Management, Access Control.

**Web Application Technologies:** HTTP Protocol, Requests, Responses and Methods. Encoding schemes. Server side functionality technologies (Java, ASP, PHP).

**Course Outcomes:**

Upon completion of this course, the students will be able to:

- i. Critically evaluate the potential countermeasures to advanced hacking techniques.
- ii. Explore about Buffer overflow
- iii. Explore about Sniffing Teechniques
- iv. Analyze and critically evaluate techniques used to break into an insecure web application and identify relevant countermeasures.
- v. Demonstrate a critical evaluation of an advanced security topic with an independent project.

**Text Books:**

1. Patrick Engebretson, The Basics of Hacking and Penetration Testing, Elsevier, 2013.
2. Network Security and Ethical Hacking, Rajat Khare, Luniver Press, 2006.

**References:**

1. Network intrusion alert: an ethical hacking guide to intrusion detection, Ankit Fadia, Manu Zacharia, Thomson Course Technology PTR, 2007.
2. Ethical Hacking, Thomas Mathew, OSB Publisher, 2003.
3. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3
HUMAN RESOURCES DEVELOPMENT					

### Course Objectives:

- Today's competitive business environment owes its success to effective management of its human resource
- The students of human resources management must be aware of basic aspects of human resource management
- To understand the functioning of human resource management in an organizational setting.
- This introductory course on Human Resource Management is designed for engineering students who wants
- The quality of the organization's employees, their attitude, behavior and satisfaction with their jobs, and their behavior towards ethics and values and a sense of fair treatment all impact the firm's productivity, level of customer service, reputation, and survival.

### UNIT-I:

Concept of HRD-objectives-Structure-Need-Scope- HRD in selected industrial organisations-significance-HRD functions-Framework-Techniques-Attributes of a HRD manager.

### UNIT – II:

HRD Strategies:- An Overview - Strategies - Training and Development - Methods - Evaluation of training programmes. HRD Process Model: Methods of Implantation, Evaluation of HRD programmes. Identification of HRD needs and Design and development of HRD programmes.

### UNIT – III:

HRD interventions: Mentoring for employee development: Concepts of Mentoring-Perspectives-Mentoring relationship-Outcomes of Mentoring programmes-Design and implementation of formal-mentoring programmes-Barriers to mentoring-Role of mentoring in development, understanding the role and responsibilities of mentor, mentee-Special issues in Mentoring-Coaching role and responsibilities.

### UNIT – IV:

Employee counselling for HRD: Overview of counselling programmes, employee assistance programme, stress management, employee wellness and health promotion. Career Planning, management, and development: Career development stages and activities, role of individual and organization in career planning, Issues in career management.

## **UNIT-V :**

The future of HRD and HRD Ethics: Research, practice and education of HRD for innovation and talent development and management, Role of HRD in developing ethical attitude and behaviour and development, Ethical problems with HRD roles. Applications of HRD: HRD Climate, HRD for managing organizational change, HRD for Workers (blue collar employees), HRD Audit.

### **Course Objectives:**

- i. To understand the basic concepts, functions and processes of human resource management
- ii. To be aware of the role, functions and functioning of human resource department of the organizations.
- iii. To Design and formulate various HRM processes such as Recruitment, Selection, Training, Development, Performance appraisals and Reward Systems, Compensation Plans and Ethical Behaviour.
- iv. Develop ways in which human resources management might diagnose a business strategy and then facilitate the internal change necessary to accomplish the strategy
- v. Evaluate the developing role of human resources in the global arena.

### **Text Books:**

1. Warner and Desimone, Human Resource and Development, Cengage India, 2016.
2. Aswathappa K. (2005) Human Resource and Personnel Management, 4th Ed, Tata Mc Graw Hill Publishing Co. Ltd

### **References:**

1. Arun Monappa; Personnel Management;
2. Rudrabasava Raj M.N. : Dynamic Personnel Administration Management of Human Resources;
3. Udai Pareek, Human Resource Development;
4. S. Ravishankar & R.K. Mishra (Ed). : Management of Human Resources in Public Enterprises;
5. Haribson F, Educational Planning and Human Resources Development, International Institute for Education, UNESCO, Paris;
6. Bell DJ, Planning Corporate' Manpower, Longman;
7. Walker James W'. Human Resource Planning, MGH.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3
MEAN STACK TECHNOLOGIES					

### Course Objectives:

From the course the student will learn

- Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client
- Writing optimized front end code HTML and JavaScript
- Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate resolution
- Design and implementation of Robust and Scalable Front-End Applications

### UNIT –I:

**Introduction to Web:** Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

### UNIT- II:

**JavaScript:** The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular JavaScript Angular JS Expressions: ARRAY, Objects, \$eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.

### UNIT –III:

**Node.js:** Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Framework, Introduction to Node.js, What is Node.js, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling, API Handling, Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

### UNIT –IV:

**RESTful Web Services:** Using the Uniform Interface, Designing URIs, Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

## **UNIT –V:**

**Mongo DB:** Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB.

**Deploying Applications:** Web hosting & Domains, Deployment Using Cloud Platforms.

### **Course Outcomes:**

After the completion of the course, student will be able to

- i. Enumerate the Basic Concepts of Web & Markup Languages
- ii. Develop web Applications using Scripting Languages & Frameworks
- iii. Make use of Express JS and Node JS frameworks
- iv. Illustrate the uses of web services concepts like restful, reactjs
- v. Apply Deployment Techniques & Working with cloud platform

### **Text Books:**

1. Programming the World Wide Web, Robert W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. Pro Mean Stack Development, ELadElrom, Apress
4. Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
5. JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
6. Web Hosting for Dummies, Peter Pollock, John Wiley Brand

### **References:**

1. Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly(2006).
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly(2012).
3. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
5. Express.JS Guide, The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

### **E-Resources:**

1. <http://www.upriss.org.uk/perl/PerlCourse.html>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3
SCRIPTING LANGUAGES					

### Course Objectives:

From the course the student will

- Understand the concepts of scripting languages for developing web based projects
- Illustrates object oriented concepts like PHP, PYTHON, PERL
- Create database connections using PHP and build the website for the world
- Demonstrate IP address for connecting the web servers
- Analyze the internet ware application, security issues and frame worksforapplication

### UNIT I

Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting , ScriptingToday, Characteristics of Scripting Languages, Uses for Scripting Languages, WebScripting, and the universe of Scripting Languages. PERL- Names and Values, Variables,Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regularexpressions, subroutines.

### UNIT II

Advanced PERL: Finer points of looping, pack and unpack, file system, eval, datastructures,packages, modules, objects, interfacing to the operating system, CreatingInternet ware applications, Dirty Hands Internet Programming, security Issues.

PHP Basics: PHP Basics- Features, Embedding PHP Code in your Web pages, Outputtingthe data tothe browser, Data types, Variables, Constants, expressions, string interpolation,control structures, Function, Creating a Function, Function Libraries, Arrays, strings andRegular Expressions.

### UNIT III

Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication andMethodologies-Hard Coded, File Based, Database Based, IP Based, Login Administration,Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, theMcrypt package, Building Web sites for the World.



## **UNIT IV**

TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, DataStructures,input/output, procedures , strings , patterns, files, Advance TCL- eval, source,exec and uplevel commands, Name spaces, trapping errors, event driven programs, makingapplications internet aware, Nuts and Bolts Internet Programming, Security Issues, CInterface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events andBinding , Perl-Tk.

## **UNIT V**

Python: Introduction to Python language, python-syntax, statements, functions, Built-in-functionsand Methods, Modules in python, Exception Handling. Integrated WebApplications in Python – Building Small, Efficient Python Web Systems, Web ApplicationFramework.

### **Course Outcomes:**

After the completion of the course, student will be able to

- i. Understand the differences between scripting languages
- ii. Create PHP authentication Methodology for security issues.
- iii. Identify PHP encryption functions and Mcrypt Package.
- iv. Explain syntax and variables in TCL.
- v. Master an understanding of python especially the object-oriented concepts

### **Text Books:**

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3 rd Edition, Jason Gilmore, Apress Publications (Dreamtech).

### **References Books:**

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and
2. PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education. ProgrammingPython, M.Lutz,SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. PHP and MySQL by Example, E.Quigley, Prentice Hall (Pearson).
6. Perl Power, J.P.Flynt, Cengage Learning.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3

### INDUSTRIAL ROBOTICS

INDUSTRIAL ROBOTICS (Offered by ME Dept)

**Course Objectives:** The goal of the course is to familiarize the students with the concepts and techniques in robotic engineering, manipulator kinematics, dynamics and control, chose, and incorporate robotic technology in engineering systems.

- Make the students acquainted with the theoretical aspects of Robotics
- Enable the students to acquire practical experience in the field of Robotics through design projects and case studies.
- Make the students to understand the importance of robots in various fields of engineering.
- Expose the students to various robots and their operational details.

#### UNIT - I

Robotics-Introduction-classification with respect to geometrical configuration (Anatomy),Controlled system & chain type: Serial manipulator & Parallel Manipulator. Components ofIndustrial robotics- precession of movement-resolution, accuracy & repeatability-Dynamiccharacteristics- speed of motion, load carrying capacity & speed of response-Sensors-Internalsensors: Position sensors,& Velocity sensors, External sensors: Proximity sensors, Tactile Sensors, & Force or Torque sensors.

#### UNIT - II

Grippers - Mechanical Gripper-Grasping force-Engelberger-g-factors-mechanisms for actuation, Magnetic gripper ,vaccume cup gripper-considerations in gripper selection & design . Industrial robots specifications. Selection based on the Application.

#### UNIT - III

Kinematics-Manipulators Kinematics, Rotation Matrix, Homogenous Transformation Matrix, D-H transformation matrix, D-H method of assignment of frames. Direct and Inverse Kinematics for industrial robots. Differential Kinematics for planar serial robots

#### UNIT - IV

Trajectory planning: Joint space scheme- Cubic polynomial fit-Obstacle avoidance in operation space-cubic polynomial fit with via point, bleding scheme. Introduction Cartesian space scheme. Control- Interaction control, Rigid Body mechanics, Control architecture- position, path velocity, and force control systems, computed torque control, adaptive control, and Servo system for robot control.

## **UNIT - V**

Programming of Robots and Vision System-Lead through programming methods- Teach pendent overview of various textual programming languages like VAL etc. Machine (robot) vision:

### **Course outcomes:**

After this completion of this course, the student should be able to

- i. Understand the basic components of robots.
- ii. Differentiate types of robots and robot grippers.
- iii. Model forward and inverse kinematics of robot manipulators.
- iv. Analyze forces in links and joints of a robot and design intelligent robots using sensors.
- v. Programme a robot to perform tasks in industrial applications.

### **Text Books:**

1. Industrial Robotics / Groover M P /Mc Graw Hill
2. Introduction to Robotics / John J. Craig/ Pearson

### **References:**

1. Theory of Applied Robotics /Jazar/Springer.
2. Robotics / Ghosal / Oxford



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		2	0	2	3
PROGRAM ANALYSIS					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- i. Classical data flow analysis and its use
- ii. Pointer analysis and applications of pointer analysis
- iii. Static single assignment form and its application in compiler design

### UNIT - I:

**Data Flow Analysis:** Available expressions analysis, Live variables analysis, Reaching definitions analysis, Anticipable expressions analysis, A taxonomy of data flow analysis, Iterative and worklist based data flow analysis

### UNIT - II:

**Theoretical Abstractions in Data Flow Analysis:** Lattice, flow functions, monotone frameworks, confluence operators, MFP(Maximal Fixed Point)/MOP(Meet Over Paths) solution

### UNIT - III:

Introduction to interprocedural data flow analysis, Call graph, Functional Approach, Call Strings base method, Value context based interprocedural analysis

### UNIT - IV:

#### Pointer analysis:

Introduction, issues in different languages Flow insensitive: Anderson's and Steensgard's approaches Flow sensitive pointer analysis, context-insensitive vs context sensitive pointer analysis, Generalized Points-to Graph(GPG) based points-to analysis

### UNIT - V:

#### Static Single Assignment Form (SSA):

Definition of SSA, Standard SSA construction and destruction algorithms, sparse data flow analysis.

**Course Outcomes:**

The students should be able to:

- i. Apply data flow analysis techniques to calculate various properties of small programs
- ii. Understand the mathematical ideas used in data flow analysis techniques
- iii. Apply data flow analysis techniques to calculate various properties of small programs with more than one function
- iv. Understanding pointer analysis and its applications
- v. Construct static single assignment form for any program

**Text Books:**

1. Data Flow Analysis: Theory and Practice, Khedker, Sanyal, Karkare, CRC Press 2009.
2. Advanced Compiler Design and Implementation, Muchnick, Morgan Kaufmann 1997.

**References:**

1. Principles of Program Analysis: Nielson, Nielson, Hankin, Springer 2004
2. Compilers: Principles, Techniques and Tools (2nd Edition), Aho, Lam, Sethi, Ullman, Addison Wesley 2006.

**E-resources:**

1. SSA-based compiler Design, <http://ssabook.gforge.inria.fr/latest/book.pdf>
2. Generalized Points-to Graphs: A Precise and Scalable Abstraction for Points-to Analysis, <https://dl.acm.org/doi/abs/10.1145/3382092>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		3	0	0	3
MANAGEMENT AND ORGANIZATIONAL BEHAVIOR					

### Course Objectives:

- To familiarize with the process of management, principles, leadership styles and basic concepts on Organisation.
- To know how to apply basic knowledge of statistics in quality control and to study about the inventory management.
- To provide conceptual knowledge on functional management that is on Human resource management and Marketing management.
- To provide basic insight into Strategic Management and corporate planning with SWOT analysis.
- To know about the contemporary management practices in the globalised era.

### UNIT-I

**Introduction:** Management and organizational concepts of management and organization- Nature and Importance of Management, Functions of Management, System approach to Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Leadership Styles, Social responsibilities of Management. Designing Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, MBO, Process and concepts.

### UNIT- II

**Functional Management:** Human Resource Management (HRM) Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Wage and Salary Administration Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating. - Marketing Management: Concepts of Marketing, Marketing mix elements and marketing strategies.

### UNIT- III

**Strategic Management:** Strategic Management and Contemporary Strategic Issues: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and implementation, Generic Strategy alternatives. Bench Marking, Balanced Score Card and other Contemporary Business Strategies.

## UNIT- IV

**Individual Behavior:** Perception-Perceptual process- Impression management- Personality development – Socialization – Attitude- Process- Formation- Positive attitude- Change – Learning – Learning organizations- Reinforcement Motivation – Process- Motives – Theories of Motivation: Maslow’s Theory of Human Needs, Douglas McGregor’s Theory X and Theory Y, Herzberg’s Two-Factor Theory of Motivation,

## UNIT-V

**Group Dynamics:** Types of Groups, Stages of Group Development, Group Behaviour and Group Performance Factors, Organizational conflicts: Reasons for Conflicts, Consequences of Conflicts in Organization, Types of Conflicts, Strategies for Managing Conflicts, Organizational Climate and Culture, Stress, Causes and effects, coping strategies of stress.

### Course Outcomes:

At the end of the course, the students will be able to:

- i. To familiarize with the process of management, principles, leadership styles and basic concepts on Organization.
- ii. To know how to apply basic knowledge of statistics in quality control and to study about the inventory management.
- iii. To provide conceptual knowledge on functional management that is on Human resource management and Marketing management.
- iv. To provide basic insight into Strategic Management and Corporate planning with SWOT analysis.
- v. To know about the contemporary management practices in the globalised era.

### References:

1. Subba Rao P., *Organizational Behaviour*, Himalaya Publishing House. Mumbai.
2. Fred Luthans *Organizational Behaviour*, TMH, New Delhi.
3. Robins, Stephen P., *Fundamentals of Management*, Pearson, India.
4. Kotler Philip & Keller Kevin Lane: *Marketing Mangement* 12/e, PHI, 2007
5. Koontz &Weihrich: *Essentials of Management*, 6/e, TMH, 2007
6. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2007.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		1	0	2	2
EMPLOYABILITY SKILLS					

### Course Objectives:

The main of this course is

- To learn how to make effective presentations and impressive interviews
- To learn skills for discussing and resolving problems on the work site
- To assess and improve personal grooming
- To promote safety awareness including rules and procedures on the work site
- To develop and practice self management skills for the work site

A list of vital employability skills from the standpoint of engineering students with discussion how to potentially develop such skills through campus life.

### UNIT –I

Interview Skills: Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success.

Presentation Skills: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness.

### UNIT -II

Etiquette and Manners – Social and Business. Time Management – Concept, Essentials, Tips.

Personality Development – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

### UNIT –III

Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.

Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resolution.

### UNIT -IV

Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Management of Stress

Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertiveness Skills.



## **UNIT –V**

Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

### **Course Outcomes:**

By the end of this course, the student will be able to

- i. Make presentations effectively with appropriate body language
- ii. Recite the corporate etiquette, time management and Personality Development
- iii. Composed with Decision making and conflict management skills
- iv. Apply their core competencies to succeed in professional and personal life
- v. Understand the importance of Emotional Intelligence

### **References:**

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.
3. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand& Company Ltd., 2018.
4. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.
5. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
6. English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.



## **B. Tech (Computer Science and Engineering) - R20 Syllabus**

**University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA**

<b>IV Year-II Semester</b>	<b>PROJECT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>
<b>PROJECT WORK, SEMINAR, AND INTERNSHIP IN INDUSTRY</b>					



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>DATA COMMUNICATION</b>					

### Course Objectives:

- i. To have a detailed study of various analog and digital modulation and demodulation techniques
- ii. To have a thorough knowledge of various multiplexing schemes and Data communication protocols
- iii. To know about the standards and mechanisms of television systems.

### UNIT- I

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.

SIGNALS, NOISE, MODULATION, AND DEMODULATION: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and M-ary Encoding, Digital Modulation.

### UNIT-II

METALLIC CABLE TRANSMISSION MEDIA: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves

OPTICAL FIBER TRANSMISSION MEDIA: Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

### UNIT-III

DIGITAL TRANSMISSION: Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage to- Quantization Noise Voltage Ratio, Linear Versus Nonlinear PCM Codes, Companding, PCM Line Speed, Delta Modulation PCM and Differential PCM.

MULTIPLEXING AND T CARRIERS: Time- Division Multiplexing, T1 Digital Carrier System, Digital Line Encoding, T Carrier systems, Frequency- Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network.

#### **UNIT- IV**

**WIRELESS COMMUNICATIONS SYSTEMS:** Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

#### **UNIT-V**

**TELEPHONE INSTRUMENTS AND SIGNALS:** The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

**CELLULAR TELEPHONE SYSTEMS:** First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Interim Standard, Global system for Mobile Communications.

#### **Course Outcomes:**

By the end of this course, the student will be able to

- i. Have the knowledge of working of basic communication systems
- ii. Explore about the Transmission media
- iii. Know about Digital Transmission and Multiplexing
- iv. Know about Wireless Communication systems
- v. Have in-depth knowledge about Telephone Instruments and Cellular Systems

#### **Text Books**

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

#### **Reference Books**

1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition. TMH.
2. Data and Computer communications, 8/e, William Stallings, PHI.
3. Computer Communications and Networking Technologies, Gallow, Second Edition Thomson
4. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>INTERNETWORKING WITH TCP/IP</b>					

### Course Objectives:

- i. To understand the fundamental concepts in Internetworking, Internet Addressing, IP, UDP, and TCP Protocols, Routing Architecture, Network Virtualization and Software Defined Networking

### UNIT – I:

Introduction and Overview, Overview of Underlying Network Technologies, Internetworking Concept and Architectural Model, Protocol Layering Internet Addressing, Mapping Internet Addresses To Physical Addresses (ARP), Internet Protocol: Connectionless Datagram Delivery (IPv4, Ipv6) CIDR Sub netting.

### UNIT – II:

Internet Protocol: Forwarding IP Datagrams, Internet Protocol: Error And Control Messages (ICMP), User Datagram Protocol (UDP)

### UNIT – III:

Reliable Stream Transport Service (TCP) Routing Architecture: Cores, Peers, And Algorithms, Routing Among Autonomous Systems (BGP), Routing Within An Autonomous System (RIP, RIPng, OSPF, IS-IS).

### UNIT – IV:

Internet Multicasting , Label Switching, Flows, And MPLS, Packet Classification, Mobility And Mobile IP, Network Virtualization: VPNs, NATs, And Overlays Bootstrap And Auto configuration (DHCP, NDP, Ipv6-ND), Voice And Video Over IP (RTP, RSVP, QoS)

### UNIT – V:

Software Defined Networking (SDN, OpenFlow)

**Course outcomes:**

By the end of this course, the student will be able to Understand

- i. The working of Internetworking, Internet Addressing,
- ii. IP, UDP, and TCP Protocols,
- iii. Routing Architecture, Network Virtualization
- iv. Internet Multicasting
- v. Software Defined Networking

**Text Books:**

1. Behrouz A Forouzan, "TCP/IP Protocol Suite", TMH, 3rd Edition
2. B.A. Forouzan, "Data communication & Networking", TMH, 4th Edition.

**References:**

1. Mahbub Hasan & Raj Jain, "High performance TCP/IP Networking", PHI -2005
2. Douglas. E.Comer, "Internetworking with TCP/IP", Volume I PHI
3. Larry L. Perterson and Bruce S. Davie , "Computer Networks- A Systems Approach", 2011, Morgan Kaufmann
4. Jochen Schiiler, "Mobile Communications", Pearson, 2nd Edition.
5. Douglas E Comer, "Internetworking with TCP/IP Principles, Protocol, and Architecture" , Volume I, 6th Edition, Pearson Education, 2013
6. William Stallings, "Data and Computer Communications", 9th Edition, Pearson Education, 2011



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	2	4
<b>NETWORK PROGRAMMING</b>					

### Course Objectives:

- i. To understand to Linux utilities
- ii. To understand file handling, signals
- iii. To understand IPC, network programming in Java
- iv. To learn the basics of socket programming using TCP and UDP Sockets.
- v. To understand simple network management protocols & practical issues.

### UNIT – I

**Introduction to Network Programming:**OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

**Sockets :**Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

### UNIT – II

**TCP client server :**Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

**Elementary UDP sockets:**Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

**I/O Multiplexing:**I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server,

### UNIT – III

**Socket options:**getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

**Advanced I/O Functions-**Introduction, Socket Timeouts, recv and send Functions,readv and writev Functions, recvmsg and sendmsg Functions, Ancillary Data, How Much Data Is Queued, Sockets and Standard I/O, T/TCP: TCP for Transactions.

## UNIT – IV

**Elementary name and Address conversions:**DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

**Daemon Processes and inetdSuperserver** –Introduction, syslogd Daemon, syslog Function, daemon\_init Function, inetd Daemon, daemon\_inetd Function

**Broadcasting**-Introduction, Broadcast Addresses, Unicast versus Broadcast, dg\_cli Function Using Broadcasting, Race Conditions

**Multicasting**-Introduction, Multicast Addresses, Multicasting versus Broadcasting on A LAN, Multicasting on a WAN, Multicast Socket Options, mcast\_join and Related Functions, dg\_cli Function Using Multicasting, Receiving Mbone Session Announcements, Sending and Receiving, SNTP: Simple Network Time Protocol, SNTP (Continued)

## UNIT-V:

**Raw Sockets**-Introduction, Raw Socket Creation, Raw Socket Output, Raw Socket Input, Ping Program, Traceroute Program, An ICMP Message Daemon, Datalink Access- Introduction, BPF: BSD Packet Filter, DLPI: Data Link Provider Interface, Linux: **SOCK\_PACKET**, **libpcap**: Packet Capture Library, Examining the UDP Checksum Field. Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

## Course Outcomes:

By the end of this course, the student will be able to

- i. Write socket API based programs
- ii. Design and implement client-server applications using TCP and UDP sockets
- iii. Analyze network programs
- iv. Design and implement client/server programs using a variety of protocols and platforms.
- v. Implement specific network programming constructs on Unix platforms to create robust real-world sockets-based applications.

## Text Books:

1. UNIX Network Programming, by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Pearson Education
2. UNIX Network Programming, 1st Edition, - W. Richard Stevens. PHI.

## References:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	0	1	4
<b>WIRELESS NETWORK TECHNOLOGIES</b>					

### Course Objectives:

- i. This course examines common and different aspects of wired and wireless networks. The topics covered are: antenna basics, radio propagation, coding and error control, MAC protocols, network layer protocols to address mobility, TCP and wireless, wireless LANs and ad-hoc networks, cellular communication concepts, wireless mesh networks, long-distance and last-hop wireless technologies, and security in wireless systems.

### UNIT – I:

#### Wireless Network Architecture:

The OSI Network Model, Network Layer Technologies, Data Link Layer Technologies, Physical Layer Technologies, Operating System Considerations

Wired Network Topologies – A Refresher, Wireless Network Topologies, Wireless LAN Devices, Wireless PAN Devices, Wireless MAN Devices.

### UNIT – II:

#### Wireless Communication:

**Radio Communication Basics:**The RF Spectrum, Spread Spectrum Transmission, Wireless Multiplexing and Multiple Access Techniques, Digital Modulation Technique, RF Signal Propagation and Reception,Ultra WidebandRadio,MIMO Radio ,Near Field Communications

**Infrared Communication Basics:**The IrSpectrum, Infrared Propagation and Reception

### UNIT – III:

#### Wireless LAN Standards:

The 802.11 WLAN Standards, The 802.11 MAC Layer, 802.11 PHY Layer, 802.11 Enhancements,Other WLAN Standards.

Implementing Wireless LANs: Evaluating Wireless LAN Requirements ,Planning and Designing the Wireless LAN,Pilot Testing ,Installation and Configuration, Operation and Support

### UNIT – IV:

#### Wireless PAN Implementation:

Introduction, Bluetooth (IEEE 802.15.1), WirelessUSB ,Contents vii ZigBee (IEEE 802.15.4) ,IRDA,Near Field Communications

**Implementing Wireless PANs:**

Wireless PAN Technology Choices, Pilot Testing, Wireless PAN Security

**UNIT – V:****Wireless MANs (WiMaX):**

802.16 standards, Voice and QoS support

**Trends:** Overlay networks

**The Future of Wireless Networking Technology:**

Wireless Mesh Network Routing, Network Independent Roaming, Gigabit Wireless LANs, Cognitive Radio

**Course Outcomes:**

At the end of this course, students will be able to

- i. Understand Cellular communication concepts
- ii. Study the mobile radio propagation
- iii. Study the wireless network different type of MAC protocols
- iv. Demonstrate wireless Local and Wide area networks and their specifications.
- v. Analyze and Familiar with some of the existing and emerging wireless standards.

**Text Books:**

1. Wireless Networking Technology: From Principles to Successful Implementation -Steve Rackley
2. Principles of Wireless Networks, K. Pahlavan and P. Krishnamurthy, Pearson Education, 2002.
3. Wireless Communication and Networks, W. Stallings, Pearson Education, 2002.
4. Mobile Communications, Jochen Schiller, Addison Wesley, 2003.

**References:**

1. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
2. Wireless Communications-Andrea Goldsmith, Cambridge University Press, 2005.
3. Ad Hoc Wireless Networks: Architectures and Protocols-C. Siva ram Murthy and B.S. Manoj, 2004, PHI.
4. Wireless Communications-Theodore. S. Rapport, Pearson Education, 2nd Edn., 2002.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>CYBER SECURITY ESSENTIALS</b>					

### Course Objective:

- i. To introduce information security concepts to undergraduate engineering students, so they can defend their personal and organizational information from probable security attacks and incidents.

### UNIT-I:

**Introduction to Security:** Challenges of Securing Information, Definition of Information Security, Attackers, Attacks and Defenses.

**Systems Threats and Risks:** Software-Based Attacks, Hardware-Based Attacks, Attacks on Virtualized Systems, Hardening the Operating System, Preventing Attacks that Target the Web Browser, Hardening Web Servers, Protecting Systems from Communications-Based Attacks, Applying Software Security Applications.

### UNIT-II:

**Network Vulnerabilities and Attacks:** Network Vulnerabilities, Categories of Attacks, Methods of Network Attacks.

**Network Defenses:** Crafting a Secure Network, Applying Network Security Devices, Host and Network Intrusion Prevention Systems (HIPS/NIPS), Protocol Analyzers, Internet Content Filters, Integrated Network Security Hardware.

### UNIT-III:

**Access Control:** Access Control Models and Practices, Logical Access Control Methods, Physical Access Control.

**Authentication:** Definition of Authentication, Authentication Credentials, Extended Authentication Protocols, Remote Authentication and Security.

### UNIT-IV:

**Vulnerability Assessment:** Risk Management, Assessment, and Mitigation, Identifying Vulnerabilities.

**Security Audit:** Privilege Auditing, Usage Auditing, Monitoring Methodologies and Tools.

### UNIT-V:

**Cryptography:** Introduction to Cryptography, Cryptographic Algorithms, Using Cryptography on Files and Disks, Digital Certificates, Public Key Infrastructure, Key Management.

**Course Outcomes:**

By the end of this course, the student will be able to

- i. Understand the basics and need for information security
- ii. Identify, analyze, and evaluate infrastructure and network vulnerabilities.
- iii. Understand and analyze different access control and authentication methods.
- iv. Identify and assess current and anticipated security risks and vulnerabilities with vulnerability assessment and auditing methods.
- v. Learn the fundamentals of cryptography and how cryptography serves as the central language of information security.

**Text Book:**

Security+ Guide to Network Security Fundamentals, Third Edition, Mark Ciampa, Cengage Learning.

**References:**

- i. Principles of Information Security, Michael E. Whitman and Herbert J. Mattord, Cengage Learning.
- ii. Information Security: The Complete Reference, Rhodes-Ousley, Mark, Second Edition, McGraw-Hill.
- iii. Information Security: Principles and Practices, Mark S. Merkow, Jim Breithaupt, 2nd Edition, Pearson Education.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	0	2	4
<b>SECURE CODING</b>					

### Course Objectives:

- i. Understanding of the various security attacks and knowledge to recognize and remove common coding errors that lead to vulnerabilities.
- ii. Knowledge of outline of the techniques for developing a secure application.
- iii. Recognize opportunities to apply secure coding principles.

**UNIT-I: Introduction**-Need for secure systems, Proactive security development process, Security principles to live by and threat modeling.

**UNIT-II: Secure Coding in C**-Character strings- String manipulation errors, String Vulnerabilities and exploits Mitigation strategies for strings, Pointers, Mitigation strategies in pointer based vulnerabilities Buffer Overflow based vulnerabilities

**UNIT-III: Secure Coding in C++ and Java**-Dynamic memory management, Common errors in dynamic memory management, Memory managers, Double –free vulnerabilities, Integer security, Mitigation strategies

**UNIT-IV: Database and Web Specific Input Issues**-Quoting the Input, use of stored procedures, Building SQL statements securely, XSS related attacks and remedies

**UNIT-V: Software Security Engineering**-Requirements engineering for secure software: Misuse and abuse cases, SQUARE process model Software security practices and knowledge for architecture and design

### Course Outcomes:

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

- i. List of secure systems and various security attacks
- ii. Demonstrate the development of process of software leads to secure coding practices
- iii. Apply Secure programs and various risk in the software's
- iv. Classify various errors that lead to vulnerabilities
- v. Design Real time software and vulnerabilities

**Text Book:**

1. Michael Howard, David LeBlanc, "Writing Secure Code", Microsoft Press, 2nd Edition, 2003.

**References:**

1. Robert C. Seacord, "Secure Coding in C and C++", Pearson Education, 2nd edition, 2013.
2. Julia H. Allen, Sean J. Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, "Software Security Engineering: A guide for Project Managers", Addison-Wesley Professional, 2008.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>VULNERABILITY ASSESSMENT &amp; PENETRATION TESTING</b>					

### Course Objectives:

- To identify security vulnerabilities and weaknesses in the target applications.
- To identify how security controls can be improved to prevent hackers gaining access to operating systems and networked environments.
- To test and exploit systems using various tools.
- To understand the impact of hacking in real time machines.

**UNIT-I: Introduction**-Penetration Testing phases/Testing Process, types and Techniques, Blue/Red Teaming, Strategies of Testing, Non-Disclosure Agreement Checklist, Phases of hacking, Open-source/proprietary Pentest Methodologies

### UNIT -II - Information Gathering and Scanning-

Information gathering methodologies- Foot printing, Competitive Intelligence- DNS Enumerations- Social Engineering attacks, Port Scanning-Network Scanning- Vulnerability Scanning- NMAP scanning tool- OS Fingerprinting-Enumeration.

### UNIT-III -SystemHacking

Password cracking techniques- Key loggers- Escalating privileges- Hiding Files, Double Encoding, Steganography technologies and its Countermeasures. Active and passive sniffing- ARP Poisoning, MAC Flooding- SQL Injection - Error- based, Union-based, Time-based, Blind SQL, Out-of-band. Injection Prevention Techniques.

### UNIT- IV – AdvancedSystemHacking:

Broken Authentication, Sensitive Data Exposure, XML External Entities, Broken Access Code, XSS - Stored, Reflected, DOM Based

### UNIT-V -WirelessPentest:

Wi-Fi Authentication Modes, Bypassing WLAN Authentication, Types of Wireless Encryption, WLAN Encryption Flaws, AP Attack, Attacks on the WLAN Infrastructure, DoS-Layer1, Layer2, Layer 3, DDoS Attack, Client Misassociation, Wireless Hacking Methodology, Wireless Traffic Analysis

**Course Outcomes:**

By the end of this course, the student will be able to

- i. Explain Penetration testing phases
- ii. Illustrate information gathering methodologies
- iii. Apply System Hacking Techniques in real time applications
- iv. Explore advanced System hacking
- v. Describe Bypassing WLAN Authentication

**TextBooks:**

1. Kali Linux 2: Windows Penetration Testing, By Wolf Halton, Bo Weaver , June 2016  
PacktPublishing

**References:**

1. Mastering Modern Web Penetration Testing By Prakhar Prasad,October 2016  
PacktPublishing.
2. SQL Injection Attacks and Defense 1st Edition, by Justin Clarke-Salt, Syngress Publication





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	<b>Honors/Minor courses</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>MALWARE ANALYSIS</b>					

### Course Objectives:

- i. To understand the purpose of computer infection program.
- ii. To implement the covert channel and mechanisms.
- iii. To test and exploit various malware in open-source environment.
- iv. To analyze and design the famous virus and worms.
- v. Understand the Reverse Engineering (RE) Methodology
- vi. Disassemble products and specify the interactions between its subsystems and their functionality

**UNIT-I: Malware Basics-** General Aspect of Computer infection program, Non Self Reproducing Malware, How does Virus Operate, Virus Nomenclature, Worm Nomenclature, Recent Malware Case Studies.

**UNIT- II: Basic Analysis-** Antivirus Scanning, x86 Disassembly, Hashing, Finding Strings, Packed Malware, PE File Format, Linked Libraries & Functions, PE Header File &Section.

**UNIT-III: Advanced Static & Dynamic Analysis-**IDA Pro, Recognizing C code constructs, Analyzing malicious windows program, Debugging, OllyDbg, Kernel Debugging with WinDbg, Malware Focused Network Signatures.

**UNIT-IV: Malware Functionalities-**Malware Behavior, Covert Malware Launch, Data Encoding, Shell code Analysis.

**UNIT-V: Reverse Engineering Malware (REM):** REM Methodology, Resources for Reverse-Engineering Malware (REM) Understanding Malware Threats, Malware indicators, Malware Classification, Examining Clam AV-Signatures.

**Course Outcomes:**

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

- i. Explain the characteristics of Malware and its effects on Computing systems.
- ii. Predict the given system scenario using the appropriate tools to Identify the vulnerabilities and to perform Malware analysis.
- iii. Analyze the given Portable Executable and Non-Portable Executable files using Static and dynamic analysis techniques.
- iv. Demonstrate the Malware functionalities.
- v. How to apply anti-reverse engineering in different Applications

**Text books:**

1. Michael Sikorski, Andrew Honig “Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software” publisher Williampollock

**References:**

1. ErciFiliol, “Computer Viruses: from theory to applications”, Springer, 1<sup>st</sup> edition, 2005.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>DIGITAL IMAGE PROCESSING</b>					

### Course Objectives:

The objective of this course is to

- i. Comprehend the relation between human visual system and machine perception and processing of digital images.
- ii. Provide a detailed approach towards image processing applications like enhancement, segmentation, and compression.
- iii. segmentation, and compression.

### UNIT - I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels.

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

### UNIT - II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

### UNIT - III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

### UNIT – IV

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

## **UNIT - V**

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Apply the spatial and frequency domain image transforms
- ii. Apply image enhancement techniques.
- iii. Understand restoration of images
- iv. Understand segmentation of images.
- v. Apply image compression techniques and evaluate the basic compression algorithms.

### **Text Books:**

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson.
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- MC GRAW HILL EDUCATION.

### **References:**

1. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIPTools - Scotte Umbaugh, 2nd Ed, CRC Press, 2011
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, MC GRAW HILL EDUCATION, 2010.
3. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
4. Introductory Computer Vision Imaging Techniques and Solutions- Adrian Low, 2008, 2nd Edition.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>BIO METRICS</b>					

### Course Objective:

- i. To understand the technologies of fingerprint, iris, face and speech recognition
- ii. To understand the general principles of design of biometric systems and the underlying trade-offs.
- iii. To recognize personal privacy and security implications of biometrics based identification technology.
- iv. To identify issues in the realistic evaluation of biometrics based systems.

### UNIT-I: INTRODUCTION TO BIOMETRICS

Introduction and background – biometric technologies – passive biometrics – active biometrics - Biometrics Vs traditional techniques – Benefits of biometrics - Operation of biometric system– Key biometric processes: verification, identification and biometric matching – Performance measures in biometric systems: FAR, FRR, FTE rate, FTA rate and rate- Need for strong authentication – Protecting privacy and biometrics and policy – Biometric applications.

### UNIT-II: FINGERPRINT IDENTIFICATION TECHNOLOGY

Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges - Fingerprint Image Processing - Minutiae Determination - Fingerprint Matching: Fingerprint Classification, Matching policies.

### UNIT-III: FACE RECOGNITION

Introduction, components, Facial Scan Technologies, Face Detection, Face Recognition, Representation and Classification, Kernel-based Methods and 3D Models, Learning the Face Space, Facial Scan Strengths and Weaknesses, Methods for assessing progress in Face Recognition.

### UNIT-IV: VOICE SCAN

Introduction, Components, Features and Models, Addition Method for managing Variability, Measuring Performance, Alternative Approaches, Voice Scan Strengths and Weaknesses, NIST Speaker Recognition Evaluation Program, Biometric System Integration.

## **UNIT-V: FUSION IN BIOMETRICS**

Introduction to Multibiometric - Advantages of multimodal system, Information Fusion in Biometrics - Issues in Designing a Multibiometric System - Sources of Multiple Evidence - Levels of Fusion in Biometrics – Sensor level, Feature level, Rank level, Decision level fusion - Score level Fusion. Examples – gait based biometric systems.

### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand basic concepts of biometric technology.
- ii. Analyze fingerprint technology
- iii. Analyze face recognition systems
- iv. Understand voice based biometric recognition
- v. Understand Multi-biometric systems

### **Text Books:**

1. James Wayman, Anil Jain, Davide Maltoni, Dario Maio, —Biometric Systems, Technology Design and Performance Evaluation, Springer.
2. David D. Zhang, —Automated Biometrics: Technologies and Systems, Kluwer Academic Publishers, New Delhi.
3. Arun A. Ross, Karthik Nandakumar, A.K. Jain, —Handbook of Multibiometrics, Springer, New Delhi.

### **References:**

1. Paul Reid, —Biometrics for Network Security, Pearson Education, 2004.
2. Nalini K Ratha, Ruud Bolle, —Automatic fingerprint Recognition System, Springer. L C Jain, I Hayashi, S B Lee, U Halici, —Intelligent Biometric Techniques in
3. Fingerprint and Face Recognition, CRC Press, 1999.
4. John Chirillo, Scott Blaul, —Implementing Biometric Security, John Wiley, 2003.
5. S.Y. Kung, S.H. Lin, M.W. Mak, —Biometric Authentication: A Machine Learning Approach, Prentice Hall, 2005



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>SPEECH PROCESSING</b>					

### Course Objectives:

The objective of this course is to

- i. The aim of the course is to make the students to understand the basic characteristics of the speech
- ii. Signal about the production and perception of speech by humans.
- iii. To describe the basic techniques and practical aspects of speech analysis.
- iv. To make the students to understand different speech processing applications such as speech recognition and speaker recognition.

### UNIT - I

Fundamentals of Digital Speech Processing: Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform Lossless Tube Model, Effect of Losses In Vocal Tract, Effect of Radiation at Lips, Digital Models for Speech Signals.

### UNIT - II

Time Domain Models for Speech Processing: Introduction, Window Considerations, Short-Time-Energy and Average Magnitude Short Time Average Zero Crossing Rate, Speech Vs Silence Discrimination Using Energy and Zero Crossing, Pitch Period Estimation using a Parallel Processing Approach, The Short Time Autocorrelation Function, The Short Time Average Magnitude Difference Function, Pitch Period Estimation using The Autocorrelation Function.

### UNIT - III

Linear Predictive Coding (LPC) Analysis: Basic Principles of Linear Predictive Analysis, The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution For the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection Using LPC Parameters, Formant Analysis Using LPC Parameters.

#### **UNIT - IV**

Automatic Speech & Speaker Recognition: Basic Pattern Recognition Approaches, Parametric Representation of Speech, Evaluating the Similarity of Speech Patterns, Isolated Digit Recognition System, Continuous Digit Recognition System Hidden Markov Model (HMM) For Speech: Hidden Markov Model (HMM) for Speech Recognition, Viterbi algorithm, Training and Testing using HMMS.

#### **UNIT - V**

Speaker Recognition: Recognition techniques, Features that Distinguish Speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System. Overview of speech Enhancement, speech synthesis.

#### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand and describe the mechanisms of speech production.
- ii. Determine the speech sounds from the acoustic characteristics.
- iii. Analyze the speech signal in time and frequency domains
- iv. Analyze the speech signal in terms of the parameters of a source-filter model.
- v. Design a simple speaker recognition system.

#### **Textbooks:**

1. Digital Processing of Speech Signals: L.R Rabiner and R W Jhaung, Pearson Education.
2. Digital Processing of Speech Signals: L.R. Rabiner and S. W. Schafer, Pearson Education.
3. Speech Communications: Human & Machine - Douglas O'Shaughnessy, 2nd Ed., WileyIndia.

#### **References:**

1. Discrete Time Speech Signal Processing: Principles and Practice, Thomas F. Quateri, 1st Edition, Pearson Education.
2. Speech & Audio Signal Processing: Ben Gold & Nelson Morgan, 1st Edition, Wiley.





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	0	2	4
ADVANCED COMPUTER VISION					

### Course Objectives:

- Able to apply the core theories and algorithms of computer vision and video processing
- Understand the state-of-the-art of computer vision and image/video processing,
- Apply the applications such as vision-based modeling and interaction.

### UNIT – I:

#### Introduction to Deep Learning, Tensor flow and Keras:

What is Deep learning? Why Deep learning, Advantages, and limitations of Deep learning.

Tensor flow basics, how to build Deep learning models with Keras and Tensor flow as back end. Tensor board for visualizations.

### UNIT - II:

#### CNN for Vision Tasks:

Introduction to CNN, Deep Convolutional networks, LeNet, VGG16Net, Classification of MNIST hand written digits by CNN and FCNN models.

### UNIT - III: Generative Adversal Networks(GAN's):

What is GAN?, DGAN, Some interesting GAN structures, SRGAN, Cycle GAN, info GAN. MNIST using GAN in Tensorflow.

### UNIT - IV: Recurrent Neural Networks:

The basic RNN, RNN Cell, RNN variants, RNN topologies, Example applications of RNN. Image captioning and Annotation.

### UNIT - V: Deep Dream and Neural Style Transfer:

How the Deep dream algorithm works, Deepdream implementation in keras and tensor flow. Neural Style Transfer: Content loss, Style loss, Total variation loss, network training.

### Course Outcomes:

At the end of the course, the students will be able to:

- Identify basic concepts, terminology, theories, models and methods in the field of computer vision.
- Able to know principles of human visual system.
- Understanding the advanced methods of computer vision related to GAN, RNN, Deep Dream implementation, LeNet and MNIST etc...

- iv. Apply a design of a computer vision system for a specific problem.
- v. Apply applications of RNN in real time applications.

**Text Books:**

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems by [Aurélien Géron](#), O'Reilly.
2. Deep Learning with Python 1st Edition by François Chollet, Manning Publications.
3. Mastering Computer Vision with TensorFlow 2.x: Build advanced computer vision applications using machine learning and deep learning techniques by [Krishnendu Kar](#), Packt Publications.
4. Deep Learning with TensorFlow 2 and Keras: Regression, ConvNets, GANs, RNNs, NLP, and more with TensorFlow 2 and the Keras API, 2nd Edition

**References:**

1. Richard Szeliski “Computer Vision: Algorithms and Applications” (<http://szeliski.org/Book/>)
2. Haralick & Shapiro, “Computer and Robot Vision”, Vol II
3. G. Erard Medioni and Sing Bing Kang “Emerging topics in computer vision”
4. Emanuele Trucco and Alessandro Verri “Introductory Techniques for 3-D Computer Vision”, Prentice Hall, 1998.
5. Olivier Faugeras, “Three-Dimensional Computer Vision”, The MIT Press, 1993



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>MATHEMATICAL ESSENTIAL FOR DATA SCIENCE</b>					

### Course Objectives:

- Recall the basics of sets, natural numbers, integers, rational numbers, and real numbers.
- Learn to use the coordinate system, and plot straight lines.
- Identify the properties and differences between linear, quadratic, polynomial, exponential, and logarithmic functions.
- Find roots, maxima and minima of polynomials using algorithmic methods.
- Learn to represent sets and relations between set elements as discrete graphs using nodes and edges.
- Formulate some common real-life problems on graphs and solve them

### UNIT – 1:

Set Theory - Number system, Sets and their operations

Relations and functions - Relations and their types, Functions and their types, Rectangular coordinate system

### UNIT – 2:

Straight Lines- Slope of a line, Parallel and perpendicular lines, Representations of a Line, General equations of a line, Straight-line fit

Quadratic Functions - Quadratic functions, Minima, maxima, vertex, and slope, Quadratic Equations

### UNIT – 3:

Algebra of Polynomials - Addition, subtraction, multiplication, and division, Algorithms

### UNIT – 4:

Graphs of Polynomials - X-intercepts, multiplicities, end behavior, and turning points, Graphing & polynomial creation

Functions - Horizontal and vertical line tests, Exponential functions, Composite functions, Inverse functions

Logarithmic Functions - Properties, Graphs, Exponential equations, Logarithmic equations

**UNIT – 5:**

Graph Theory - Representation of graphs, Breadth-first search, Depth-first search, Applications of BFS and DFS

Directed Acyclic Graphs - Complexity of BFS and DFS, Topological sorting and longest path, Transitive closure, Matrix multiplication

Graph theory Algorithms - Single source shortest paths, Dijkstra's algorithm, Bellman-Ford algorithm, All-pairs shortest paths, Floyd–Warshall algorithm, Minimum cost spanning trees, Prim's algorithm, Kruskal's algorithm

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Demonstrate understanding of basic mathematical concepts in data science, relating to linear algebra, probability, and calculus.
- ii. Employ methods related to these concepts in a variety of data science applications.
- iii. Apply logical thinking to problem-solving in context.
- iv. Use appropriate technology to aid problem-solving and data analysis.
- v. Demonstrate skills in writing mathematics.

**Text Book:**

1. Introductory Algebra: a real-world approach (4th Edition) - by Ignacio Bello

**References:**

1. Mathematical Foundations Of Data Science Using R by Emmert-Streib Frank.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

### University College of Engineering Vizianagaram JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>INTRODUCTION TO DATA SCIENCE</b>					

#### Course Objectives:

- i. The course teaches critical concepts and skills in computer programming and statistical inference, in conjunction with hands-on analysis of real-world datasets, including economic data, document collections, geographical data, and social networks.
- ii. It delves into social issues surrounding data analysis such as privacy and design.

#### UNIT – I: INTRODUCTION

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

#### UNIT – II: DATA COLLECTION AND DATA PRE-PROCESSING

Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

#### UNIT – III: EXPLORATORY DATA ANALYTICS

Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

#### UNIT – IV: MODEL DEVELOPMENT

Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

#### UNIT – V: MODEL EVALUATION

Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Apply dimensionality reduction tools such as principle component analysis
- ii. Evaluate outcomes and make decisions based on data
- iii. Understand how to Use exploratory tools such as clustering and visualization tools to analyze data.
- iv. Apply dimensionality reduction tools such as principle component analysis
- v. Able to know how to Perform basic analysis of network data.

**Text Books:**

1. Data Science for Beginners, by Andrew Park
2. The Art of Data Science — A Guide for Anyone Who Works With Data, by Roger D. Peng and Elizabeth Matsui.

**References:**

1. JojoMoolayil, “Smarter Decisions : The Intersection of IoT and Data Science”,PACKT, 2016.
2. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O'Reilly, 2015.
3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”,EMC 2013
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big DataAnalytics”, IGI Global.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>DATA ANALYTICS AND VISUALIZATION</b>					

### Course Objectives:

- To demonstrate expert knowledge of data analysis, statistics, tools, techniques and technologies of data analytics and Visualization.
- To enable learners to develop knowledge and skills in current and emerging areas of data analytics and Visualization.
- To formulate and implement a novel research idea and conduct research in the field of data analytics and Visualization.
- To critically assess and evaluate business and technical strategies for data analytics.
- To develop project-management, critical-thinking, problem-solving and decisionmaking skills.

### UNIT -1:INTRODUCTION AND TABLEAU PRIMER:

Introduction to data visualization Data for data graphics Tableau introduction

### UNIT-2:DESIGN PRINCIPLES

Design principles Categorical, time series, and statistical data graphics

### UNIT-3:Display types,Geospatial displays, Interactivity

Storytelling Multivariate displays, Geospatial displays, Dashboards, interactive and animated displays

### UNIT-4:Data Definitions and Analysis Techniques:

Elements, Variables, and Data categorization,Levels of Measurement, Data management and indexing,Introduction to statistical learning.

### Descriptive Statistics:

Measures of central tendency, Measures of location of dispersions

### UNIT-5:Basic analysis techniques

Statistical hypothesis generation and testing,Chi-Square test,t-Test,Analysis of variance,Correlationanalysis,Maximum likelihood test.

**Course Outcomes:**

After completing the course, student will be able to:

- i. Present data with visual representations for your target audience, task, and data;
- ii. Identify appropriate data visualization techniques given particular requirements imposed by the data;
- iii. Display types, Geospatial displays, Interactivity
- iv. Data Definitions and Analysis Techniques
- v. Implement the analytic algorithms and Basic analysis techniques

**Text Books:**

1. Sosulski, K. (2018). Data Visualization Made Simple: Insights into Becoming Visual. New York: Routledge.
2. Probability & Statistics for Engineers & Scientists (9th Edn.), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Prentice Hall Inc.
3. The Elements of Statistical Learning, Data Mining, Inference, and Prediction (2nd Edn.), Trevor Hastie Robert Tibshirani Jerome Friedman, Springer, 2014

**References:**

1. An Introduction to Statistical Learning: with Applications in R, G James, D. Witten, T Hastie, and R. Tibshirani, Springer, 2013
2. Software for Data Analysis: Programming with R (Statistics and Computing), John M. Chambers, Springer
3. Mining Massive Data Sets, A. Rajaraman and J. Ullman, Cambridge University Press, 2012
4. Advances in Complex Data Modeling and Computational Methods in Statistics, Anna Maria Paganoni and Piercesare Secchi, Springer, 2013

**Optional readings:**

1. Few, S. (2012). Show me the numbers: Designing tables and graphs to enlighten. Burlingame, CA: Analytics Press.
2. Few, S. (2006). Information dashboard design: The effective visual communication of data. Sebastopol: O'Reilly.
3. Ware, C & Kaufman, M. (2008). Visual thinking for design. Burlington: Morgan Kaufmann Publishers.
4. Wong, D. (2011). The Wall Street Journal guide to information graphics: The dos and don'ts of presenting data, facts and figures. New York: W.W. Norton & Company.
5. Yau, N. (2011). Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics. Indianapolis: O'Reilly.
6. Yau, N. (2013). Data Points: Visualization that means something. Indianapolis: O'Reilly.





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	0	2	4
PYTHON FOR DATA SCIENCE					

### Course Objectives:

- The course aims at equipping participants to be able to use python programming for solving data science problems

### UNIT-I

Introduction to Python for Data Science, Introduction to Python, Introduction to Spyder - Part 1, Introduction to Spyder - Part 2, Variables and Datatypes, Operators,

### UNIT-II

Jupyter setup, Sequence\_data\_part\_1, Sequence\_data\_part\_2, Sequence\_data\_part\_3, Numpy

### UNIT-III

Reading Data, Pandas Dataframes I, Pandas Dataframes II, Pandas Dataframes III, Control Structures and Functions, Exploratory Data Analysis, Data visualization Part-I, Data visualization Part-II, Dealing with Missing Data

### UNIT-IV

Introduction to Classification. Case Study on Classification Part I, Case Study on Classification Part II

### UNIT-V

Introduction to Regression. Case Study on Regression Part I, Case Study on Regression Part II

### Course Outcomes:

At the end of the course, the students will be able to:

- Understand how to work in Jupyter Notebook.
- Know how to import data in Python.
- Ability to learn pandas library, the main methods for Data Frames.
- Able to apply the Basic Data types, Operators, how to clean and merge datasets.
- Apply Classification and Regression case studies in real time environment.

**Text Books:**

1. Python Data Science Handbook: Essential Tools for Working with Data-Oreilly Publication- author by Jake VanderPlus.
2. Python for Data Science For Dummies authors by Luca Massaron John Paul Mueller.

**References:**

1. <https://nptel.ac.in/courses/106/106/106106212/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>DATA STRUCTURES</b>					

### Course Objectives:

- i. To teach efficient storage mechanisms of data for an easy access.
- ii. To design and implementation of various basic and advanced data structures.
- iii. To introduce various techniques for representation of the data in the real world.
- iv. To develop application using data structures.
- v. To improve the logical ability

### UNIT-I

Time and space complexity, Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

### UNIT –II

Stacks-Operations, array and linked representations of stacks, stack applications -infix to postfix conversion, postfix expression evaluation, recursion implementation.

### UNIT-III

Queues-operations, array, and linked representations. Circular Queue operations, Dequeues, applications of queues.

### UNIT-IV

Searching and Sorting – Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, shell sort, radix sort, Searching-linear and binary search methods, comparison of sorting and searching methods.

### UNIT-V

Trees – Definitions, tree representation, properties of trees, Binary tree, Binary tree representation, binary tree properties, binary tree traversals, binary tree implementation, applications of trees.

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Student will be able to choose appropriate data structure as applied to specified problem definition.
- ii. Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- iii. Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- iv. Students will be able to use linear and non-linear data structures like stacks, queues, linked list.

**Text Books:**

1. Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI.

**References:**

1. Data structures: A Pseudocode Approach with C, 2nd edition,
2. R.F.Gilberg and B.A.Forouzan, Cengage Learning.
3. Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson.
4. Data Structures using C, A.M.Tanenbaum, Y. Langsam, M.J.Augenstein, Pearson.
5. Data structures and Program Design in C, 2nd edition, R.Kruse, C.L.Tondo and B.Leung, Pearson



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	<b>Honors/Minor courses</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>DATABASE MANAGEMENT SYSTEM</b>					

### Course Objectives:

- i. To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

**UNIT -I: INTRODUCTION** -Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications.Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

**UNIT -II: RELATIONAL MODEL:** Introduction to relational model, concepts of domain, attribute, tuple, relation, im portance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion).

**UNIT -III: ENTITY RELATIONSHIP MODEL:** Introduction, Representation of entities, attributes, entity set, relationship, rel ationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams. SQL: Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation , ordering, implementation of different types of joins, view(updatable and non -updatable), relational set operations.

**UNIT -IV: SCHEMA REFINEMENT (NORMALIZATION):** Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce -codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

**UNIT V: TRANSACTION CONCEPT:** Transaction State, Implementation of atomicity and Durability, Concurrent Executions, Serializability, Recoverability , Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

B+ Trees: Search, Insert, Delete algorithms, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes , Index data Structures, Hash Based Indexing: Tree base Indexing , Comparison of File Organizations, Indexes and Performance Tuning

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Describe a relational database and object -oriented database.
- ii. Create, maintain, and manipulate a relational database using SQL
- iii. Describe ER model and normalization for database design.
- iv. Examine issues in data storage and query processing and can formulate appropriate solutions.
- v. Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage and Design and build database system for a given real world problem

**Text Books:**

1. Data base Management Systems, 3/ e, Raghurama Krishnan, Johannes Gehrke, TMH
2. Data base System Concepts, 5/ e, Silberschatz, Korth, TMH
3. Introduction to Database Systems, 8/ e C J Date, PEA.

**References:**

1. Database Management System, 6/ e Ramez Elmasri, Shamkant B. Navathe, PEA
2. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>OPERATING SYSTEM</b>					

### Course Objectives:

- i. Provide knowledge about the services rendered by operating systems.
- ii. Present detail discussion on processes, threads and scheduling algorithms.
- iii. Expose the student with different techniques of process synchronization and handling deadlocks.
- iv. Discuss various file-system implementation issues and memory management techniques.
- v. Learn mass storage management.

### UNIT-I: Operating Systems Overview:

Introduction: what is an operating system, Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types, Operating System Generation.

### UNIT-II: Process Management:

Process concept: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication.

Multithreaded Programming: Overview, Multithreading models, Threading Issues. Process scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

### UNIT-III: Synchronization:

Process Synchronization: The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples.

Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

### UNIT-IV: Memory Management:

Memory Management strategies: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing.

### **UNIT-V: File system Interface-**

The concept of a file, Access Methods, Directory and Disk structure, File system mounting.

File System implementation: File system structure, allocation methods, free-space management.

Mass-storage structure: Overview of Mass-storage structure, Disk scheduling, Device drivers.

### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand the importance of operating systems and different types of system calls.
- ii. Analyze the communication between processes and various process scheduling algorithms.
- iii. Understand the process synchronization, different ways for deadlocks handling.
- iv. Analyze various memory mapping techniques and different page replacement methods.
- v. Evaluate various file allocation and disk scheduling algorithms.

### **Text Books:**

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems).

### **References:**

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3<sup>rd</sup> edition, PHI, 2006.
2. Dhamdhare D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009.
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>COMPUTER NETWORKS</b>					

### Course Objectives:

- i. To introduce the fundamental various types of computer networks.
- ii. To understand state-of-the-art in network protocols, architectures, and applications.
- iii. To explore the various layers of OSI Model.
- iv. To introduce UDP and TCP Models.

### UNIT-I:

Introduction: Network Hardware and software Reference models- The OSI Reference Model-the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Physical Layer: Guided Transmission Media, Digital Modulation and Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing.

### UNIT-II:

The Data Link Layer - Design Issues, Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols, Sliding Window Protocols.

Channel allocation methods: TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols – IEEE standard 802 for LANS – Ethernet, Token Bus, Token ring, Bridges and IEEE 802.11 and 802.16. Data link layer switching, virtual LANs.

### UNIT-III:

Network layer Routing Algorithms: Design Issues, Routing Algorithms-Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms- General principles of congestion control, Congestion prevention polices, Choke packets, Load shedding, and Jitter Control.

Internet Working : Tunnelling, internetworking, Fragmentation, Network layer in the internet– IP protocols, IP address, Subnets, Internet control protocols, OSPF, BGP, Internet multicasting, Mobile IP, IPV6.

#### **UNIT IV:**

The Transport Layer: Elements of transport protocols – addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, End to end protocols: UDP, Real Time Transport Protocol.

The Internet Transport Protocol: TCP- reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call.

#### **UNIT – V:**

Application Layer: WWW and HTTP: Architecture- Client (Browser), Server, Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format.

The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery.

#### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand OSI and TCP/IP reference models with an emphasis to Physical Layer, Data Link Layer and Network Layer.
- ii. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.
- iii. Solve problems related to Flow control, Error control, Congestion control and Network Routing.
- iv. Design and compute subnet masks and addresses for networking requirements Understand how internet works.
- v. Understand the Application Layer protocols

#### **Text Books:**

1. Data Communications and Networks – Behrouz A. Forouzan, Third Edition TMH.
2. Computer Networks, 5ed, David Patterson, Elsevier
3. Computer Networks: Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
4. Computer Networks, Mayank Dave, CENGAGE

#### **References:**

1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan,
3. Firouz Mosharraf, McGraw Hill Education
4. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
5. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson The TCP/IP Guide, by Charles M. Kozierok,

Free online Resource,

1. <http://www.tcpipguide.com/free/index.htm>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
INTRODUCTION TO ARTIFICIAL INTELLIGENCE					

### Course Objectives:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
- To understand the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

### UNIT- I:

**Introduction:** history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

### UNIT -II:

**Problem solving:** state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A\*, constraints satisfaction.

**Problem reduction and game playing:** Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

### UNIT -III:

**Logic concepts:** Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic.

### UNIT -IV:

**Knowledge representation:** Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

**Advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web

## **UNIT–V:**

**Expert system and applications:** Introduction phases in building expert systems, expert system versus traditional systems  
**Uncertainty measure:** probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory ,Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

### **CourseOutcomes:**

At the end of the course, the students will be able to:

- i. Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
- ii. Apply the language/framework of different AI methods for a given problem
- iii. Implement basic AI algorithms- standard search algorithms or dynamic programming
- iv. Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports
- v. Design Expert Systems using fuzzy logic theory

### **Text Books:**

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning
2. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

### **References:**

1. Artificial Intelligence- Deepak Khemani, TMH, 2013
2. Introduction to Artificial Intelligence, Patterson, PHI
3. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Luger, 5th ed, PEA

### **e-Resources:**

1. <https://nptel.ac.in/courses/106/105/106105077/>
2. <http://aima.cs.berkeley.edu/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>MATHEMATICS FOR MACHINE LEARNING</b>					

### Course Objectives:

- i. The purpose of this course is to provide a mathematically rigorous introduction to these developments with emphasis on methods and their analysis.

### UNIT-1:

**Linear Algebra:** Systems of Linear Equations, Matrices, Solving systems of linear equations, Vector Spaces, Linear Independence, Basis and Rank, Linear Mappings.

**Analytic Geometry:** Norms, Inner Products, Lengths and Distances, Angles and Orthogonality, Orthonormal Basis, Orthogonal Complement, Inner Product of Functions, Orthogonal Projections.

### UNIT-2:

**Matrix Decompositions:** Determinant and Trace, Eigen values and Eigen vectors, Cholesky Decomposition, Eigen decomposition and Diagonalization, Singular Value Decomposition, Matrix Approximation.

**Vector Calculus:** Differentiation of Univariate Functions, Partial differentiation and Gradients, Gradients of vector valued functions, Gradients of Matrices, Useful identities for computing gradients, Backpropagation and Automatic Differentiation

### UNIT-3:

**Probability and Distributions:** Construction of a Probability space, Discrete and Continuous probabilities, sum rule, product rule and Bayes Theorem, Summary statistics and Independence, Gaussian Distribution.

**Continuous Optimization:** Optimization using Gradient Descent, Constrained optimization and Lagrange Multipliers, Convex Optimization.

### UNIT-4:

**Linear Regression:** Problem Formulation, Parameter Estimation, Bayesian Linear Regression, Maximum Likelihood as Orthogonal Projection.

**Dimensionality Reduction with Principal Component Analysis:** Problem setting, Maximum Variance Perspective, Projection Perspective, Eigenvector computation and Low Rank Approximations, PCA in High Dimensions, Latent Variable Perspective.

### UNIT-5

**Density Estimation with Gaussian Mixture Models:** Gaussian Mixture Model, Parameter Learning via Maximum Likelihood, EM Algorithm, Latent-Variable Perspective.

**Classification with Support Vector Machines:** Separating Hyperplanes, Primal Support Vector Machine, Dual Support Vector Machine, Kernels, Numerical Solution.

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand the strengths and weaknesses of many popular machine learning approaches.
- ii. Justify the underlying mathematical relationships within and across Machine Learning algorithms.
- iii. Evaluate the several areas of mathematics beyond calculus
- iv. Solve problems in a range of mathematical applications
- v. Apply various methods to compute the probabilities of events, Analyze and interpret statistical data using appropriate probability distributions.

**Text Books:**

1. <https://mml-book.github.io/book/mml-book.pdf> - c 2021 M. P. Deisenroth, A. A. Faisal, C. S. Ong. Published by Cambridge University Press (2020).

**References:**

1. <https://www.youtube.com/watch?v=1VSZtNYMntM>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>MACHINE LEARNING</b>					

### Course Objectives:

- i. To learn well-known machine learning algorithms
- ii. To evaluate and compare the performance of various machine learning algorithms
- iii. Able to differentiate regression models and distance based models and ANNs.

**UNIT I: INTRODUCTION:** Well-posed learning problems, designing a learning system, Perspectives, and issues in machine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

### UNIT II: LINEAR REGRESSION & LOGISTIC REGRESSION:

**PREDICTING NUMERIC VALUES: REGRESSION** - Finding the best fit lines with linear regression, locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff.

**LOGISTIC REGRESSION:** Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients.

**UNIT III: ARTIFICIAL NEURAL NETWORKS:** Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks

**UNIT IV: EVALUATION HYPOTHESES:** Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

**UNIT V: SUPPORT VECTOR MACHINES:** Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full Platt SMO, Using Kernels for more Complex data.

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Recognize the characteristics of machine learning algorithms and their applications to real world problems
- ii. Able to differentiate linear and logistic regressions.
- iii. Able to write and evaluate hypothesis
- iv. Understand the concepts of Artificial neural networks
- v. Can apply kernel methods to solve real world problems.

**Text Books:**

1. Machine Learning ,Tom M. Mitchell, MGH
2. Machine Learning in Action, Peter Harington, 2012, Cengage.`

**References:**

1. Introducti on to Machine Learning, EthemAlpaydin, PHI, 2004
2. A course in Machine Learning , Hall Daum'e III





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	<b>Honors/Minor courses</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>DEEP LEARNING</b>					

### Course Objectives:

At the end of the course, the students will be expected to:

- i. Learn deep learning methods for working with sequential data,
- ii. Learn deep recurrent and memory networks,
- iii. Learn deep Turing machines,
- iv. Apply such deep learning mechanisms to various learning problems.
- v. Know the open issues in deep learning, and have a grasp of the current research directions.

### UNIT I:

Introduction: Various paradigms of learning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques.

Feed forward neural network: Artificial Neural Network, activation function, multi-layer neural network.

### UNIT II:

Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization.

Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.

### UNIT III:

Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network, Recurrent Neural Network, and Deep Belief Network.

### UNIT IV:

Probabilistic Neural Network: Hopfield Net, Boltzmann machine, RBMs, Sigmoid net, Auto encoders.

Sequence Modeling: LSTM, Gated RNNs & Deep Generative Models

### UNIT V:

Applications: Object recognition, sparse coding, computer vision, natural language processing.

Introduction to Deep Learning Tools: Caffe, Theano, Torch.

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Demonstrate the basic concepts fundamental learning techniques and layers.
- ii. Discuss the Neural Network training, various random models.
- iii. Explain different types of deep learning network models.
- iv. Classify the Probabilistic Neural Networks and Sequence model neural networks.
- v. Implement tools on Deep Learning techniques.

**Text Books:**

1. Goodfellow, I., Bengio, Y., and Courville, A., Deep Learning, MIT Press, 2016..
2. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.

**References:**

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub, G., H., and Van Loan, C., F, JHU Press, 2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>CYBER SECURITY</b>					

### Course Objectives:

In this course, the student will learn about

- The essential building blocks and basic concepts around cyber security such as Confidentiality, Integrity, Availability, Authentication, Authorization, Vulnerability, Threat & Risk and so on.

### UNIT –I:

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

### UNIT –II:

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

### UNIT -III:

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management .

Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

### UNIT- IV:

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.

Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

## **UNIT –V:**

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Illustrate the broad set of technical, social & political aspects of Cyber Security and
- ii. security management methods to maintain security protection
- iii. Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure
- iv. Illustrate the nature of secure software development and operating systems
- v. Demonstrate the role security management plays in cyber security defense and legal and social issues at play in developing solutions

### **Text Books:**

1. Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
2. Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

### **References:**

1. Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
2. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology, 2011.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>CYBER CRIME INVESTIGATION AND DIGITAL FORENSICS</b>					

### Course Objectives:

- i. Able to identify security risks and take preventive steps
- ii. To understand the forensics fundamentals.
- iii. To understand the evidence capturing process.
- iv. To understand the preservation of digital evidence

**UNIT-I: Introduction:** Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime.

**UNIT-II: Cyber Crime Issues:** Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses.

**UNIT-III: Investigation:** Introduction to Cyber Crime Investigation, Investigation Tools, e-Discovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

**UNIT-IV: Digital Forensics:** Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics.

**UNIT- V: Laws And Acts:** Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC, Electronic Communication Privacy ACT, Legal Policies.

**Course Outcomes:**

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

- i. Acquire the definition of computer forensics fundamentals.
- ii. Describe the types of computer forensics technology
- iii. Analyze various computer forensics systems.
- iv. Illustrate the methods for data recovery, evidence collection and data seizure.
- v. Summarize duplication and preservation of digital evidence.

**References:**

- i. Nelson Phillips and EnfingerSteuart, "Computer Forensics andInvestigations", Cengage Learning,New Delhi, 2009.
- ii. Kevin Mandia, Chris Prorise, Matt Pepe, "Incident Response and ComputerForensics", TataMcGraw-Hill, New Delhi, 2006.
- iii. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>CRYPTOGRAPHY AND APPLICATIONS</b>					

### Course Objective:

This course aims at training students to master the:

- i. The concepts of classical encryption techniques and concepts of finite fields and number theory
- ii. Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms.
- iii. Design issues and working principles of various authentication protocols and PKI standards.
- iv. Various secure communication standards including Kerberos, IPsec, SSL/TLS, S/MIME and PGP

### UNIT- I:

Introduction to Security: Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, a Model for Network Security  
Mathematics of Cryptography: Algebraic Structures (Groups, Rings, Fields and Galois Fields), Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms

### UNIT- II:

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography  
Block Ciphers: Traditional Block Cipher Structure, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles, Advanced Encryption Standard, AES Structure, AES Transformation Functions, AES Key Expansion, Multiple Encryption and Triple DES, Block Cipher Modes of Operation

### UNIT- III:

Public-Key Cryptography: Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Cryptography  
Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA)  
Message Authentication Codes: Requirements for Message Authentication Codes, HMAC, CMAC

#### **UNIT- IV:**

Digital Signatures: Digital Signatures, Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme, NIST Digital Signature Algorithm, Elliptic Curve Digital Signature Algorithm

Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure

User Authentication: Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption:

#### **UNIT -V:**

Transport-Level Security: Web Security Considerations, Transport Layer Security, Secure Shell (SSH)

Electronic Mail Security: S/MIME, Pretty Good Privacy

IP Security: IP Security Overview, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange

#### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Identify information security goals and acquire fundamental knowledge on the concepts of finite fields and number theory
- ii. Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
- iii. Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
- iv. Apply different digital signature algorithms to achieve authentication and create secure applications
- v. Apply network security basics, analyze different attacks on networks and evaluate the performance of security protocols like SSL, IPSec, and PGP

#### **Text Book:**

1. Cryptography and Network Security, William Stallings, 8th Edition, Pearson Education

#### **References:**

1. Cryptography, Network Security and Cyber Laws, Bernard L. Menezes, Ravinder Kumar, Cengage Learning.
2. Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyaya, 3rd Edition, Mc-GrawHill.
3. Network Security Illustrated, Jason Albanese, Wes Sonnenreich, McGraw Hill.





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>BLACK CHAIN TECHNOLOGY</b>					

### Course Objectives:

- i. To provide conceptual understanding of the function of Blockchain as a method of securing distributed ledgers.
- ii. To understand the structure of a Blockchain and why/when it is better than a simple distributed database
- iii. To make students understand the technological underpinnings of Blockchain operations as distributed data structures and decision making systems.
- iv. To understand a “smart” contract and its legal implications.

### UNIT-I:

Introduction: History and basics, Types of Blockchain, Consensus, CAP Theorem. Cryptographic Hash Functions: Properties of hash functions, Secure Hash Algorithm, Merkle trees, Patricia trees.

### UNIT-II:

Decentralization: Decentralization using Blockchain, Methods of decentralization, decentralization framework, Blockchain and full ecosystem decentralization, Smart contracts, Decentralized Organizations, Platforms for decentralization.

### UNIT-III:

Bitcoin: Introduction to Bitcoin, Digital keys and addresses, Transactions, Blockchain, The Bitcoin network, Bitcoin payments, Bitcoin Clients and APIs, Alternatives to Proof of Work, Bitcoin limitations.

### UNIT-IV:

Ethereum: Smart Contracts, Introduction to Ethereum, The Ethereum network, Components of the Ethereum ecosystem, Blocks and Blockchain, Fee schedule, Ethereum Development Environment, Solidity.

### UNIT-V:

Hyperledger: Introduction, Hyperledger Projects, Protocol, Architecture, Hyperledger Fabric, Sawtooth Lake, Corda.

Challenges and Opportunities: Scalability, Privacy, Blockchain for IoT, Emerging trends

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Define and explain the fundamentals of Blockchain.
- ii. Understand decentralization and the role of Blockchain in it.
- iii. Understand and analyze Bitcoin Cryptocurrency and underlying Blockchain network.
- iv. Understand Ethereum currency and platform, and develop applications using Solidity.
- v. Understand Hyperledger project and its components; critically analyze the challenges and future opportunities in Blockchain technology.

**Text Book:**

- i. Mastering Blockchain, Imran Bashir, Second Edition, Packt Publishing.

**References:**

- i. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andrea Antonopoulos, and O'Reilly.
- ii. Blockchain Blueprint for a New Economy, Melanie Swan, O'Reilly.
- iii. Mastering Bitcoin: Programming the Open Blockchain, Antonopoulos, Andreas M. O'Reilly.
- iv. Blockchain Technology: Cryptocurrency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	0	2	4
<b>OBJECT ORIENTED PROGRAMMING THROUGH JAVA</b>					

### Course Objectives:

- Implementing programs for user interface and application development using core java principles.
- Focus on object oriented concepts and java program structure and its installation.
- Comprehension of java programming constructs, control structures in JavaProgramming Constructs.
- Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
- Understanding of Thread concepts and I/O in Java.
- Being able to build dynamic user interfaces using applets and Event handling in java.
- Understanding of Various Components of Java AWT and Swing and write Code Snippets using them.

### UNIT I:

#### Introduction to OOP

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program Structures, Installation of JDK1.6.

### UNIT II:

Variables, Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals, Operators- Binary, Unary and Ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of Control-Branching, Conditional Loops.

**Classes and Objects-** Classes, Objects, Creating Objects, Methods, Constructors-Constructor Overloading, Cleaning up Unused Objects-Garbage Collector, Class Variable and Methods-Static Keyword, this keyword, Arrays, Command Line Arguments.

### UNIT III:

**Inheritance:** Types of Inheritance, Deriving Classes using Extends Keyword, Method Overloading, Super Keyword, Final Keyword, Abstract Class.

**Interfaces, Packages and Enumeration:** Interface-Extending Interface, Interface Vs Abstract Classes, Packages-Creating Packages, Using Packages, Access Protection, java.lang Package.

**Exceptions & Assertions** - Introduction, Exception Handling Techniques-try...catch, throw, throws, finally block, User Defined Exception, Exception Encapsulation and Enrichment, Assertions.

#### **UNIT IV:**

**Multi-Threading:** java.lang.Thread, The main Thread, Creation of New Threads, Thread Priority, Multithreading- Using isAlive() and join(), Synchronization, Suspending and Resuming Threads, Communication between Threads.

**Input/Output:** Reading and Writing data, java.io package.

**Applet:** Applet Class, Applet Structure, Applet Life Cycle, Sample Applet Programs.

#### **UNIT V:**

**Event Handling:** Event Delegation Model, Sources of Event, Event Listeners, Adapter Classes, Inner Classes.

**Abstract Window Toolkit :**Importance of AWT, Java.awt.package, Components and Containers, Button, Label, Check Box, Radio Buttons, List Boxes, Choice Boxes, Text Field and Text Area, Container Classes, LayOuts, Menu, Scroll bar.

**Swings:** Introduction, JFrame, JApplet, JPanel, Components in Swings, Layout Managers, List and JScroll Pane, SplitPane, JTabbedPane, JTree, DialogBox, Pluggable Look and Feel.

#### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand Java programming concepts and utilize Java Graphical User Interface inProgram writing.
- ii. Write, compile, execute and troubleshoot Java programming for networking concepts.
- iii. Build Java Application for distributed environment.
- iv. Design and Develop multi-tier applications.
- v. Identify and Analyze Enterprise applications.

#### **Text Books:**

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, Saurabh Choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.

#### **References:**

1. JAVA Programming, K.Rajkumar, Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech.
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , University Press.
5. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya,Selvi, Chu TMH.
6. Introduction to Java Programming, 7th ed, Y Daniel Liang, Pearson.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>PYTHON PROGRAMMING</b>					

### Course Objectives:

- i. Introduction to Scripting Language
- ii. Exposure to various problems solving approaches of computer science

### UNIT-I:

Features and History of Python, Print and Input functions, variables, keywords, comments

Types: Numerical Types (int, float, complex), Strings, Boolean, Type Conversion

Operators: Arithmetic, Relational, Logical, Bitwise, Assignment, Identity, Membership

Control Flow: Indentation, if-elif-else, while, for, break, continue, pass, else-with loops

### UNIT-II:

Functions: Introduction, Required Arguments, Default Arguments, Keyword Arguments, Variable Number of Arguments, Variable Scope and Lifetime, global variables, Lambda Functions, Command Line Arguments

Object Oriented Programming: Classes and Objects, built-in class methods and attributes, 'self', constructor, destructor, inheritance, data hiding, overriding methods and overloading operators

### UNIT-III:

Data Structures: Lists, Nested Lists, List Comprehensions, Tuples and Sequences, Sets, Dictionaries

File I/O: opening, closing, reading and writing.

### UNIT-IV:

Exception Handling: Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block Without Exception, the else Clause, Raising Exceptions, Built-in and User-defined Exceptions, The finally block

Introduction modules, import and from-import, Packages in Python, used defined modules and packages, PIP.

## **UNIT-V:**

The Python Standard Library: numeric and mathematical modules, string processing, date & time, calendar, operating system, web browser

Graphics with turtle: Motion Control, Pen, Colour, Fill, multiple turtles, reset and clear

GUI design with tkinter: Button, Canvas, Checkbutton, Entry, Frame, Label, Listbox, Menu, Menubutton, Message, Radiobutton, Scale, Scrollbar, Text

### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand the fundamentals of scripting language and its learning environment.
- ii. Acquire the knowledge of data types, operators and control structures.
- iii. Understand Object oriented concepts and apply the concepts of data structures to real world data.
- iv. Apply the concept of modularity and implement different packages to solve complex problems. Understand Object oriented concepts and handle different errors through exceptions.
- v. Develop multithreaded application using standard libraries.

### **Text Books:**

1. Python Programming using problem solving approach, Reema Thareja, Oxford University Press.
2. Learning Python, Mark Lutz, O'Reilly
3. Programming Python, Fourth Edition, Mark Lutz, O'Reilly Media.

### **References:**

1. Introduction to Computation and Programming Using Python with Application to Understanding, John V. Guttag, PHI.
2. Think Python: How to think like a Computer Scientist, Allen Downey, Green Tea Press.
3. Head First Python: A Brain-Friendly Guide, Second Edition, Paul Barry, O'Reilly
4. The Python Standard Library, Python 3.6.5 documentation (Web Resource)  
<https://docs.python.org/3/library/>



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	0	2	4
<b>BASIC WEB DESIGNING</b>					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- i. How does a website work and web related terminology.
- ii. Web standards and W3C elements
- iii. Responsive Web Designing
- iv. Client-side Scripting Languages(Front End)
- v. Domains and Hosting

### UNIT - I: Introduction to Web and Web Design Principles:

Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Web pages, Website, Web browsers and Web servers and Web protocols.

Basic principles involved in developing a web site, Planning process, Five Goldenrules of web designing ,Designing navigation bar , Page design ,Home Page Layout ,Design concept.

### UNIT - II: Introduction to HTML:

What is HTML, HTML Documents, Basic structure of an HTML document ,Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Introduction to elements of HTML, Working with Text, Working with Lists, Tables andFrames, Working with Hyperlinks, Images and Multimedia ,Working with Forms andcontrols.

### UNIT - III: Introduction to Cascading Style Sheets:

Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, working with Lists and Tables, CSS Id and Class ,Box Model(Introduction, Border properties, Padding Properties, Margin properties) ,CSS Advanced(Grouping, Dimension, Display, Positioning,Floating, Align,Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color ,Creating page Layout and Site Designs.

### UNIT - IV: Introduction to Java Script:

What is Java Script? Basics of Java Script: Variables, functions, and Operators, select HTML elements with Java Script,Java Script Events andEventHandlers,Regular expressions and pattern matching in Java Script.Form validation using Java Script.

## UNIT - V: Introduction to Web Publishing or Hosting:

Creating the Web Site, Saving the site, Working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites. Case study: Web publishing and hosting using Heroku cloud platform (<https://www.heroku.com/>).

### Course Outcomes:

At the end of the course, the students will be able to:

- i. Learn the basic terminology related to web and web development.
- ii. Learn how to design static web pages by using HTML.
- iii. Should be able to create web pages with enhanced look and feel by Using CSS.
- iv. Learn to use Java Script for design thick clients and to design interactive responsive form design and validations.
- v. Learn to design and host and publish websites in various domains.

<b>Text Books</b>		
Name of Authors	Title of the Book	Publisher
Kogent Learning Solutions Inc.	HTML 5 in simple steps	Dreamtech Press
	A beginner's guide to HTML	NCSA, 14 <sup>th</sup> May, 2003
Murray, Tom/Lynchburg	Creating a Web Page and Web Site	College, 2002
<b>Reference Books</b>		
	Web Designing & Architecture-Educational Technology Centre	University of Buffalo
Steven M. Schafer	HTML, XHTML, and CSS Bible, 5ed	Wiley India
John Duckett	Beginning HTML, XHTML, CSS, and JavaScript	Wiley India
Ian Pouncey, Richard York	Beginning CSS: Cascading Style Sheets for Web Design	Wiley India
Kogent Learning	Web Technologies: HTML, Javascript	Wiley India





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	0	2	4
ADVANCED WEB TECHNOLOGIES					

### Course Objectives:

The objectives of this course is to acquire knowledge on the

- This course is designed to introduce students with basic web programming experience to the advanced web programming languages and techniques associated with the World Wide Web.
- The course will introduce web-based media-rich programming tools for creating interactive web pages.
- The course will introduce Web Frame works like React JS and Angular JS for quick and efficient design and implementation of web applications.

### UNIT - I Introduction to HTML5, CSS3 and Boot strap:

Basic Syntax, Standard HTML Document Structure, HTML5 tags ,Audio, video, 2D canvas Drawing and animations using HTML5.

**CSS 3:** What is SCSS, Difference between CSS and SCSS, Introduction to SASS tool and CSS template design using Bootstrap

### UNIT - II: Java Script and DHTML:

DHTML: Java Script DOM, Interactive and responsive web page designing, Positioning Moving and Changing Elements.

**Java Script Web Frame works:** React JS, Angular JS and Vue JS, Single PageApplication(SPA) Design and Development using Angular JS.

### UNIT - III: XML:

Introduction to XML, XML vs HTML, Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches. AJAX A New Approach: Introduction to AJAX. Request and Response mechanism of AJAX.

### UNIT - IV: PHP Programming:

Introducing PHP: Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Datatypes, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL.

## **UNIT - V: Web Services:**

JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java WebService Client- Describing Web Services: WSDL- Representing Data Types: XMLSchemaCommunicating Object Data: SOAP Related Technologies-Software Installation-Storing Java Objects as Files-Databases and Java Servlets.

### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Analyze a web page and Create web pages using HTML5 and Cascading Styles sheets 3 and Boot strap.
- ii. Build dynamic web pages using Java Script and Write simple client-side scripts using AJAX.
- iii. Learn to use XML for data exchange and transfer over web and XML parsing and validation techniques.
- iv. Build web applications using PHP.
- v. Describe a java web services.

### **Text Books:**

1. Programming the World Wide Web, Robert W Sebesta, 7ed, Pearson.
2. Introducing HTML5 (Voices That Matter) 2nd Edition by Bruce Lawson / Remy Sharp Lawson / Sharp, Kindle publishers.
3. Web Technologies, Uttam K Roy, Oxford
4. HTML, CSS, and JavaScript All in One: Covering HTML5, CSS3, and ES6, Sams Teach Yourself 3rd Edition, by Julie Meloni and, Jennifer Kyrnin. Pearson
5. JavaScript Frameworks for Modern Web Development: The Essential Frameworks, Libraries, and Tools to Learn Right Now 2nd ed. Edition by Sufyan bin Uzayr , Nicholas Cloud , Tim Ambler. Apress.
6. Java Web Services: Up and Running: A Quick, Practical, and Thorough Introduction 2<sup>nd</sup> Edition, Kindle Edition by Martin Kalin.

### **References:**

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly( 2006
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning .



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>COMPUTER ORGANIZATION AND ARCHITECTURE</b>					

### Course Objectives:

- i. To understand the structure, function and characteristics of computer system.
- ii. To understand the design of the various functional units and components of computers.
- iii. To explain the function of each element of a memory hierarchy.
- iv. Illustration of algorithms for basic arithmetic operations using binary and decimal representation.
- v. Illustration of data paths and control flow for sequencing in CPU's, Micro Programming of control unit of CPU.

### UNIT -I:

#### Basic Structure of Computers:

Functional unit, Basic Operational Concepts, Bus Structures, System Software, Performance, The History of Computer Development. Data Representation: Data Types, Complements, Fixed Point Representation, Floating Point Representation.

#### Basic Computer Organization and Design:

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory – Reference Instructions, Interrupt, Design of Basic Computer, Design of Accumulator Logic.

### UNIT -II:

**Machine Instruction and Programs:** Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Addressing Modes, Basic Input/output Operations, Importance of Stacks and Queues in Computer Programming Equation. Component of Instructions: Logic Instructions, Shift and Rotate Instructions, Branch Instructions.

**Computer Arithmetic:** Addition, Subtraction, Multiplication and Division Algorithms. Floating point Arithmetic Operations and Decimal Arithmetic Operations.

### UNIT -III:

**The Memory System:** Memory System Consideration RAM and ROM, Flash Memory, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory and Virtual Memory, Secondary Storage: Magnetic Hard Disks, Optical Disks.

**Pipeline Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline.

#### **UNIT -IV:**

**Processing Unit:** Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control.

**Micro Programmed Control:** Microinstructions, Micro Program Sequencing, Wide Branch Addressing and Microinstructions with Next – Address Field.

#### **UNIT -V:**

##### **Input / Output Organization:**

Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

##### **Parallelism:**

Instruction-Level-Parallelism – Parallel Processing Challenges – Flynn’s Classification: SISD, MIMD, SIMD, SPMD and Vector Architectures, – Hardware Multithreading – Multi-Core Processors and Other Shared Memory Multiprocessors.

#### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand the architecture of modern computer.
- ii. Analyze the Performance of a computer using performance equation.
- iii. Understand different instruction types.
- iv. Calculate the effective address of an operand by addressing modes.
- v. Understand how computer stores positive and negative numbers.
- vi. Understand how computer performs arithmetic operation of positive and negative numbers.

#### **Text Books:**

1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 6th Edition, McGraw Hill.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

#### **References:**

1. Computer Organization and Architecture – William Stallings tenth Edition, Pearson/PHI.
2. Computer System Architecture, M. Morris Mano, 3 rd Edition Pearson Education.
3. Structured Computer Organization – Andrew S.Tanenbaum, 4<sup>th</sup> Edition PHI/Pearson.
4. Fundamentals of Computer Organization and Design, SivaramaDandamudi Springer Int.Edition.



## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>CLIENT SERVER COMPUTING</b>					

### UNIT I

The business opportunity driving forces, major issues in information technology right sizing - review of host and non-distributed computing. Basis of distributed computing decomposition approaches layers vs tiers.

### UNIT II

Networking, Types of network, Basis of client / server computing components. Benefits, Evaluation of Client-server computing, Client / server computing approaches, applications development, cost implementation. TCP/IP Protocol suit.

### UNIT III

Open System Standards For Client/Server Computing: Understanding Client / Server computing, Dispelling the Myths, Obstacles Upfront and Hidden Open system and standards, Factors for success. Socket programming and socket API.

Two Tier Computing: Introduction client Tier, Hardware and Software requirements operating system services, Types of Client Server -Tier, Types of Server-Eight layers of Software.

### UNIT IV

Three-Tier Computing: Introduction and comparison of two and three tier- Client side, server side and middleware side, Hardware and Software requirements, Transaction servers, TP lite Vs TP Heavy. CGI scripting.

Middleware: Hardware and Software requirements, Netware connectivity, Types of Middleware, Data Base middleware Standards.

### UNIT V

Multi Tier Computing: Overview, Benefits, Disadvantages, Components, Tier separations and interaction

Thin Client Computing: Introduction to computing models – Comparison, Components, environments.

Front End Tools: Overview, The Client components, Essential features of a front-end tools. Case Studies Account and Financial system, Sales automation, and courseware system.

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Recognize and describe the working of Computer Networks, Client server computing.
- ii. Illustrate reference models with layers, protocols and interfaces.
- iii. Summarize functionalities of different Layers.
- iv. Combine and distinguish functionalities of different Layers.
- v. Model the Client- Server computing using different media.
- vi. Apply client –server computing in real life application development.

**Text Books**

1. Dawana Travis Dewire, “Client/Server Computing”, Tata McGraw -Hill Publishing Company Limited, New Delhi, 2003.
2. Patrick Smith and Steve Guengesich, “Client/Server Computing”, Prentice Hall of India, New Delhi, 2002.

**References:**

1. Robert Orfali, Dan Harkey and Jeri Edwards, “Essential Client/Server Survival Guide”, Galgotia Publications, New Delhi, 2001.
2. Joel P Kaster, “Understanding Thin Client/Server Computing”, Prentice Hall of India, New Delhi, 2001.
3. Jein Edwards, “3 tier Client/server at Work”, Wiley Computer Publishing, USA, 1999.
4. AshhofaiolTomy Martin, “Building N - tier Applications with COM and VB 6.0”, Wiley Computer Publishing, Singapore, 1999.
5. Travis Derive D, “Second - generation Client/Server Computing” McGraw Hill, New Delhi, 1997.
6. Karen Watterson, “Client/Server Technology for “Managers “ Addition -Wesley, USA, 1996.
7. Larry J Vaughn, “Client/Server System Design and implementation”, Mc Graw Hill inc, USA, 1995



## B. Tech (Computer Science and Engineering) - R20 Syllabus

**University College of Engineering Vizianagaram**  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:**  
**KAKINADA**

	<b>Honors/Minor courses</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>DISTRIBUTED SYSTEMS</b>					

### Course Objectives:

- i. To understand the foundations of distributed systems.
- ii. To learn issues related to clock Synchronization, the need for global state and remote invocation in distributed systems.
- iii. To learn distributed mutual exclusion and deadlock detection algorithms.
- iv. To learn the characteristics of peer-to-peer, distributed shared memory systems and security.
- v. To understand the significance of agreement, distributed transactions, fault tolerance and recovery protocols in Distributed Systems.

### UNIT- I:

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges, Relation to Computer system Components, Motivation, Relation to Parallel Systems, Message-Passing systems versus Shared Memory systems, Primitives for Distributed Communication, Synchronous versus Asynchronous executions, Design issues and Challenges. A model of Distributed Computations: A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of Process Communications. Logical Time: A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP.

### UNIT –II:

Message Ordering and Group Communication: Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order.

Global state and Snapshot Recording Algorithms: Introduction, System model and definitions, Snapshot algorithms for FIFO channels. Remote Invocation: Introduction, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection, Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI.

### UNIT- III:

Distributed Mutual Exclusion Algorithms: Introduction, Preliminaries, Lamport’s algorithm, Ricart-Agrawala algorithm, Maekawa’s algorithm, Suzuki–Kasami’s broadcast algorithm. Deadlock Detection in Distributed Systems: Introduction, System model, Preliminaries, Models of deadlocks, Knapp’s Classification, Algorithms for the Single Resource Model, the AND model and the OR model.

#### **UNIT -IV:**

Peer-to-Peer Computing and Overlay Graphs: Introduction, Data indexing and overlays, Chord distributed hash table, Content addressable networks, Tapestry. Distributed Shared Memory: Abstraction and advantages, Memory consistency models, Shared Memory Mutual Exclusion.

Security: Introduction, Overview of Security Techniques, Cryptographic Algorithms, Digital Signatures, Cryptography Pragmatics.

#### **UNIT –V:**

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions. Check Pointing and Rollback Recovery: Introduction, Background and definitions, Issues in Failure recovery, Checkpoint-based recovery, Log-based rollback recovery, coordinated check pointing algorithm, Algorithms for asynchronous and synchronous check pointing and recovery. Consensus and Agreement Algorithms: Problem definition, Overview of results, Agreement in a Failure-Free system (synchronous or asynchronous).

#### **Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand the foundations and issues of distributed systems.
- ii. Illustrate the various synchronization issues, global state and remote invocation for distributed systems.
- iii. Develop the Mutual Exclusion and Deadlock detection algorithms in distributed systems.
- iv. Apply the features of peer-to-peer, distributed shared memory systems and security.
- v. Analyze the distributed transactions, agreement protocols and fault tolerance mechanisms in distributed systems.

#### **Text Books:**

1. Distributed computing: Principles, algorithms, and systems, Ajay D Kshemkalyani and Mukesh Singhal, Cambridge University Press, 2011.
2. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and Tim Kindberg, 5th Edition, Pearson Education, 2012.

#### **References:**

1. Distributed Operating Systems: Concepts and Design, Pradeep K Sinha, Prentice Hall of India, 2007.
2. Advanced concepts in operating systems. Mukesh Singhal and Niranjana G. Shivaratri, McGraw-Hill, 1994.
3. Distributed Systems: Principles and Paradigms, Tanenbaum A.S., Van Steen M., Pearson Education, 2007.

#### **E-Resources:**

1. <https://nptel.ac.in/courses/106/106/106106168/>





## B. Tech (Computer Science and Engineering) - R20 Syllabus

University College of Engineering Vizianagaram  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:  
KAKINADA

	Honors/Minor courses	L	T	P	C
		3	1	0	4
<b>CLOUD COMPUTING</b>					

### Course Objective:

- i. Cloud Computing is a large-scale distributed computing paradigm which has become a driving force for information technology over the past several years. This course introduces cloud computing technology to undergraduate engineering students, so they can learn, apply and use this technology in their future careers.

### UNIT-I:

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

### UNIT-II:

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud Computing, Cloud Computing is a Service, Cloud Computing is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

### UNIT-III:

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud Application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

### UNIT-IV:

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

**UNIT-V:**

Cloud Providers and Applications: EMC, EMC IT, Captiva Cloud Toolkit, Google Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rackspace, VMware, Manjra soft, Aneka Platform.

**Course Outcomes:**

At the end of the course, the students will be able to:

- i. Understand and analyze different computing paradigms
- ii. Understand the basics of cloud computing and different cloud deployment models.
- iii. Understand different cloud implementation and management strategies.
- iv. Understand and evaluate different cloud service models.
- v. Identify, analyze and use different cloud services/applications/tools available from key cloud providers.

**Text Book:**

1. Essentials of Cloud Computing, K. Chandrasekhran, CRC press.

**References:**

1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, SubraKumaraswamy, ShahedLatif, O'Reilly.