

**GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A)
CHAITANYA NAGAR, RAJAHMUNDRY**

**Course Structure of
B.Tech. Programme in Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
GRBT-20**

I Year I Semester

S. No	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201HB101	BSC	Mathematics-I	3	0	0	3	30	70	100
2	201HB102	HSMC	Communicative English-1	3	0	0	3	30	70	100
3	201HB103b	BSC	Engineering Chemistry	3	0	0	3	30	70	100
4	201CS104	ESC	Problem Solving & Programming in C	3	0	0	3	30	70	100
5	201ME105	ESC	Engineering Graphics	1	0	4	3	30	70	100
6	201HB111b	BSC	Engineering Chemistry Laboratory	0	0	3	1.5	50	50	100
7	201CS112	ESC	Problem Solving & Programming in C Lab	0	0	3	1.5	50	50	100
8	201ME113c	ESC	Computer Engineering Workshop	0	0	3	1.5	50	50	100
Total =				13	0	13	19.5	300	500	800

I Year II Semester

S. No	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201HB201	BSC	Mathematics-II	3	0	0	3	30	70	100
2	201HB202a	BSC	Applied Physics	3	0	0	3	30	70	100
3	201EC203	ESC	Fundamentals of Digital Electronics	3	0	0	3	30	70	100
4	201CS204	ESC	Data Structures	3	0	0	3	30	70	100
5	201CS205	ESC	Python Programming	3	0	0	3	30	70	100
6	201HB296	MC	Environmental Science	2	0	0	0	30*	---	---
7	201HB211a	BSC	Applied Physics Laboratory	0	0	3	1.5	50	50	100
8	201HB212	HSMC	Communicative English Lab	0	0	3	1.5	50	50	100
9	201CS213	ESC	Data Structures Lab	0	0	3	1.5	50	50	100
Total =				17	0	9	19.5	300	500	800

After II B.Tech II Semester Summer Internship/ Mini Project-1 is mandatory. Evaluation should be III B.Tech I semester.

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Course Structure of
B.Tech. Programme in Computer Science and Engineering
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GRBT-20

III Year I Semester

S. No	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201AI501	PCC	Natural Language Processing	3	0	0	3	30	70	100
2	201CS502	PCC	Compiler Design	3	0	0	3	30	70	100
3	201CS503	PCC	Computer Networks	3	0	0	3	30	70	100
4	201AI564A 201AI564B 201AI564C 201AI564D	PE/IC	Professional Elective-I A) Operating Systems B) Data Visualization C) DevOps D) MOOCs: NPTEL/SWAYAM	3	0	0	3	30	70	100
5	201CE565a 201EE565a 201ME565a 201EC565a 201CS565a 201MM565a 201AM565a 201PT565a 201MB565a	OE1	Open Electives –I/ Job Oriented Elective a) Environmental Pollution & Control b) Fundamentals of Utilization of Electrical Energy c) Robotics d) Microprocessors and its interfacing e) Foundations of Operating Systems f) Elements of Mining Technology g) Basic Automobile Engineering h) Fundamentals of Petroleum Engineering i) Principles of Management.	3	0	0	3	30	70	100
6	201HB591	MC	Quantitative Aptitude and Reasoning	2	0	0	0	30	70	100
7	201AI511	PCC	Natural Language Processing Lab	0	0	3	1.5	50	50	100
8	201CS512	PCC	Internetworking Protocol Lab	0	0	3	1.5	50	50	100
9	201CS581	SOC	Web Application Development Using Full Stack Module -3	0	1	2	2	--	50	50
10	201CS531/201CS521	PROJ	Summer Internship/ Mini Project-1	0	0	0	1.5	100	---	100
Total =				17	1	8	21.5	380	570	950

Minor courses	4			
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Course Structure of B.Tech. Programme in Computer Science and Engineering (Artificial Intelligence and Machine Learning)

III Year II Semester

Industrial/ Research Internship/ Miniproject-2 (Mandatory) after third year to be evaluated during IV year I semester

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A)

CHAITANYA NAGAR, RAJAHMUNDRY

Tentative Course Structure of

B.Tech. Programme in Computer Science and Engineering

(Artificial Intelligence and Machine Learning)

GRBT-20

IV Year I Semester

S. No	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201CS761A 201CS761B 201AI761C 201AI761D	PEC	Professional Elective-III A) Distributed Systems B) Cloud Computing C) Speech Processing D) Deep Learning	3	0	0	3	30	70	100
2	201AI762A 201AI762B 201AI762C 201AI762D	PEC	Professional Elective-IV A) Robotic Process Automation B) Information Storage and Management C) Data Mining and Knowledge discovery D) MOOCS-NPTEL/SWAYAM	3	0	0	3	30	70	100
3	201AI763A 201AI763B 201AI763C 201AI763D	PEC	Professional Elective-V A) Computer Vision B) Quantum Computing C) Web Engineering D) MOOCS-NPTEL/SWAYAM	3	0	0	3	30	70	100
4	201CE764a 201EE764a 201ME764a 201EC764a 201CS764a 201MM764a 201AM764a 201PT764a 201MB764a	OEC	Open Electives-III/ Job Oriented Elective a) Building Technology b) Fundamentals of Smart Grid Technologies c) Nano Technology and its Applications d) Embedded Systems e) Information Security f) Mining and its Importance g) Modern Vehicle Technology h) Introduction to Petroleum Production Engineering i) Entrepreneurship for Engineers	3		0	3	30	70	100
5	201CE765a 201EE765a 201ME765a 201EC765a 201CS765a 201MM765a 201AM765a 201PT765a 201MB765a	OEC	Open Electives –IV/ Job Oriented Elective a) Safety Engineering b) Basics of Electrical Measurements and Instrumentation c) Introduction to Operations Research d) Digital Image Processing e) Human Computer Interaction f) Remote Sensing & GIS in Mining g) Alternative Energy	3	0	0	3	30	70	100

			Resources for Automotives h) Basic Concepts in Reservoir Engineering i) Digital Marketing							
6	201HB796	HSMC	UHV 2: Understanding Harmony	3	0	0	3	30	70	100
7	201CS781	SOC	Deep Learning using Python	0	1	2	2	---	50	50
8	201CS721	PROJ	Industrial/ Research Internship/ Mini Project-2	0	0	0	3	100	---	100
Total =				18	1	2	23	280	470	750
Minor courses				4	0	0	4			

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**Tentative Course Structure of
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GRBT-20**

IV Year II Semester

S. No	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201AI841	PROJ	Project Project Work, Seminar, Internship	0	0	0	8	60	140	200
Total =				0	0	0	8			

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech I Sem.			
Course Code	PROBLEM SOLVING & PROGRAMMING IN C CSE (AI & ML)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics, Logical Ability		3	0	0	3

Course Objective(s):

- To provide exposure to problem solving through programming.
- To train the student to the basic concepts of C-programming language.
- The course involves a lab component which is designed to give the student hands-on experience with the concepts.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Obtain the knowledge about different languages used in computer programming and basic terminology used in the computer programming.

CO-2: Write algorithm, flow chart, and structure of C program and make use of different C tokens inside C program.

CO-3: Develop program by using Control structure, different looping and Jump statement.

CO-4: Implement applications of Array, Structure and String inside the program. Also acquire the knowledge of different FILE operations.

CO-5: Obtain knowledge about accessing the memory in the program and also to develop the program by using different types of function calls.

UNIT-1

Introduction to Computer Programming: Computer Languages: Machine level, Assembly level and High-level language.

Introduction to Problem Solving: Algorithm, Pseudo code and Flowchart.

UNIT-2

C Fundamentals: Structure of a C-program, C-character set, C Tokens: variables, constants, identifiers, data types and sizes, operators, Preprocessor.

I/O Functions: Header files, Standard I/O library functions-formatted I/O functions.

Decision making statements: simple if, if-else, nested if-else, else-if ladder, switch-case statements and sample programs.

Iterative Statements: for, while, do-while. Jump Statements-break, continue, goto

UNIT-3

Introduction to Arrays, Strings

Arrays- Declaration, initialization, storing and accessing elements of 1-D, 2-D and multi-dimensional arrays.

Array Applications: addition, multiplication, transpose, symmetry of a matrix.

Strings: declaration, initialization, reading and writing characters into strings, string operations, character and string manipulation functions.

UNIT-4

Pointers, Functions & Storage Classes

Pointers: Introduction to pointers, defining a pointer variable, Pointer to Pointer, Examples of pointers, using pointers in expressions, pointers and arrays.

Functions: declaration, definition, prototype, function call, return statement, types of functions, parameter passing methods, and function recursion.

Storage Classes: Auto, Static, Extern and Register

UNIT-5

Structures, Unions and Files

Structure and Union: Declaration, initialization, storing and accessing elements by using structure and union.

Files: Definition, Input and output operation into file.

Text Books

1. Problem Solving and Programming Concepts, Maureen Sprankle and Jim Hubbard, Pearson, 9th Edition.
2. “Programming in ANSI C” by E.Balagurusamy, McGraw Hill Publications.
3. “Programming in C” by Ashok N. Kamthane, 2/e Pearson, 2013.
4. “The C – Programming language” B.W.Kernighan, Dennis M. Ritchie.PHI.
5. “Let Us C”, 12th Edition by Yashavant P. Kanetkar online in India.

Reference Books

1. Programming in C by Ajay Mittal, Pearson.
2. Programming with C, Bichkar, Universities press.
3. Programming in C, ReemaThareja, OXFORD.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech I Sem.			
Course Code	COMPUTER ENGINEERING WORKSHOP CSE, CSE(CYBER SECURITY), CSE(AL & ML)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic knowledge about computers.		0	0	3	1.5

Course Objective(s):

The objective of this course is to

- Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
- Demonstrate basic command line interface commands on Linux
- Teach the usage of Internet for productivity and self paced lifelong learning
- Describe about Compression, Multimedia and Antivirus tools
- Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools

Course Outcome(s):

Students should be able to:

CO-1: Assemble and disassemble components of a PC

CO-2: Construct a fully functional virtual machine, Summarize various Linux operating system commands,

CO-3: Recognize characters & extract text from scanned images, Create audio files and podcasts

Computer Hardware:

Experiment 1: Identification of peripherals of a PC, Laptop, Server and Smart Phones: Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Operating Systems:

Experiment 2: Virtual Machine setup:

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

Experiment 2: Operating System installation:

- Installing an Operating System such as Linux on Computer hardware.

Experiment 3: Linux Operating System commands:

- General command syntax
- Basic help commands
- Basic File system commands
- Date and Time
- Basic Filters and Text processing
- Basic File compression commands
- Miscellaneous: apt-get, vi editor

Networking and Internet:

Experiment 4: Networking Commands:

- ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp, wget, route

Experiment 5: Internet Services:

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/ plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Email creation and usage, Creating a Digital Profile on LinkedIn

Productivity Tools:

Experiment 6: Basic HTML tags, Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Preparation of a simple website/ homepage,

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Features to be covered: Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, etc.,

Internet of Things (IoT): IoT fundamentals, applications, protocols, communication models, architecture, IoT devices

Office Tools:

Experiment 7: Demonstration and Practice on Text Editors like Notepad++, Sublime Text, Atom, Brackets, Visual code, etc

Experiment 8: Demonstration and practice on Microsoft Word, Power Point, Microsoft Excel

Experiment 9: Demonstration and practice on LaTeX and produce professional pdf documents.

Text Books:

- 1) Computer Fundamentals, Anita Goel, Pearson Education, 2017
- 2) PC Hardware Trouble Shooting Made Easy, TMH

References Books:

- 1) Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand

e-Resources:

- 1) https://explorersposts.grc.nasa.gov/post631/2006-2007/computer_basics/ComputerPorts.doc

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech I Sem.			
Course Code	PROBLEM SOLVING & PROGRAMMING IN C LAB CSE (AI & ML)				
Teaching	Total contact hours-36	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics, Logical Ability		0	0	3	1.5

Course Objective(s):

- To provide exposure to problem solving through programming.
- To train the student to the basic concepts of C-programming language.
- The course involves a lab component which is designed to give the student hands-on experience with the concepts.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-6: Obtain the knowledge about different languages used in computer programming and basic terminology used in the computer programming.

CO-7: Write algorithm, flow chart, and structure of C program and make use of different C tokens inside C program.

CO-8: Develop program by using Control structure, different looping and Jump statement.

CO-9: Implement applications of Array, Structure and String inside the program. Also acquire the knowledge of different FILE operations.

CO-10: Obtain knowledge about accessing the memory in the program and also to develop the program by using different types of function calls.

Programs:

1. Write a C Program to
 - a) Calculate the area of triangle using the formula

$$\text{Area} = (s(s-a)(s-b)(s-c))^{1/2}$$
, where $s = (a+b+c)/2$
 - b) To find the largest of three numbers using ternary operator.
 - c) To swap two numbers without using a temporary variable.
2. Write a C program that perform the following operations:
 - a) Reading and writing a complex number
 - b) Addition of two complex numbers
3. Write a C program to
 - a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
 - b) Find the roots of a quadratic equation.
 - c) Take two integer operands and one operator from the user, Performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
4. Write a C Program to print the following patterns
 - a) Floyd's triangle
 - b) Pyramid
 - c) Pascal Triangle

5. Write a C program to
 - a) Check whether the given number is Armstrong number or not.
 - b) Check whether the given number is palindrome or not.
 - c) Find the sum of individual digits of a positive integer and find the reverse of the given number.
 - d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
 - e) Generate all the prime numbers between 1 and n, where n is a value supplied by the user.
6. Write a C Program to
 - a) Print the multiplication table of a given number n up to a given value, where n is entered by the user.
 - b) Enter a decimal number, and calculate and display the binary equivalent of that number.
 - c) Enter a binary number, and calculate the decimal equivalent of that number.
7. Write a C program to
 - a) Interchange the largest and smallest numbers in the array.
 - b) Implement a linear search.
 - c) Implement binary search.
8. Write a C program to
 - a) Examples which explore the use of structures, union and other user defined variables.
 - b) Declare a structure for calculating the percentage achieved by 3 students, by considering the structure elements as name, pin no, mark1, mark2, mark3.
9. Write C Programs
 - a) For the following string operations without using the built in functions to
 - i. length of a string
 - ii. reverse a string
 - iii. append a string to another string
 - iv. compare two strings
 - b) Write a C Programs to check whether the given string "MADAM" is palindrome or not without using the built in functions.
10. Write a C program
 - a) Use functions to perform the following operations:
 - i. To insert a sub-string in to given main string from a given position.
 - ii. To delete n Characters from a given position in a given string.
 - b) To replace a character of string either from beginning or ending or at a specified location
11. Write a C Programs for the following string operations with and without using the built in functions
 - a) To reverse a string using pointers.
 - b) To concatenate two strings by using pointer.
12. Write a C programs that use both recursive and non-recursive functions for the following
 - a. To find the factorial of a given integer.
 - b. To find the GCD of two given integers.
 - c. To find Fibonacci sequence.
13. Write C programs to

- a) Find the area of triangle by using call by value and call by reference concepts.
- b) Pointer based function to exchange value of two integers using passing by address.

14. Write C programs to

- a) Read and display the data from a file.
- b) Copy the data from one file to another file.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. (II Semester)			
Course Code XXXXXXX	MATHEMATICS - II (ALL BRANCHES)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Fundamentals of differentiation and interation.		3	0	0	3

Course Objective:

- To enlighten the learners in the concept of differential equations and multivariable calculus
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Solve first order differential equations.
C02:	Solve higher order differential equations with constant coefficients.
C03:	Apply the knowledge of approximating and find the roots of polynomial and transcendental equation in practical engineering problems.
C04:	Understand numerical differentiation and integration.
C05:	Apply the Knowledge of different algorithms for approximating the solution of ordinary differential equations in practical Engineering problems.

Syllabus:

UNIT I: Mean value theorems, First Order differential equations & Applications 10 hrs

Rolle's theorem, Lagrange's mean value theorem, Cauchy mean value theorem.

Formation of differential equation, Solutions of Exact and Reducible to exact, Linear and Bernoulli differential equations. Applications: Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories.

UNIT II: Higher Order Differential Equations and Applications 10 hrs

Solutions of higher order differential equations with constant coefficients. Solutions of Non-homogeneous equations of higher order with constant coefficients with RHS term of the form e^{ax} , $\sin ax$, $\cos ax$, Polynomials in x , $e^{ax}V(x)$, $xV(x)$. Method of variation of parameters. Applications: Mass spring system and L-C-R Circuit problems.

Unit III: Solutions of Algebraic, Transcendental Equations and Interpolation 8 hrs

Introduction, Bisection method, Regula-Falsi method and Newton-Raphson method. Interpolation: Newton's Forward and backward formulae, Lagrange's interpolation.

UNIT IV: Numerical Differentiation and Integration 10 hrs

Numerical differentiation: Forward and backward difference formulae. Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rule.

UNIT V: Numerical Solution of Ordinary Differential Equations 10 hrs

Solutions of ordinary differential equations- Taylor's series, Euler method, Modified Euler method, Runge-Kutta method (Second and fourth order) for first initial value problems.

MATHEMATICS – II

Text books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. T.K.V.Iyenger, et.al., Engineering Mathematics, Volume-I, S.Chand Publication, 2016.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.

Web Links:

1. <https://nptel.ac.in/courses/111108081/>
2. <https://nptel.ac.in/courses/111105093/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	-	-	-	1
CO2	3	3	3	2	-	-	-	-	-	-	-	1
CO3	3	3	3	2	-	-	-	-	-	-	-	1
CO4	3	3	3	2	-	-	-	-	-	-	-	1
CO5	3	3	2	2	-	-	-	-	-	-	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech		
Course Code	APPLIED PHYSICS (For All Circuital Branches like ECE, EEE, CSE, CSE (AI & ML), CSE (Cyber Security) etc)			
Teaching	Total Contact Hours – 48h	L	T	P
		3	0	0

Course Objective

Physics Curriculum is re-oriented to the needs of all the branches of graduate engineering courses that serve as a transit to understand specific advanced topics.

Course Outcomes:

On Completion of the course, the students will be able	
CO1:	To impart knowledge of physical optical phenomenon like Interference, Diffraction and polarization involving design of optical instruments with higher resolution
CO2:	To demonstrate the concept on the absorption and spontaneous and stimulated emission in two level system and the conditions for laser amplification and explain the working principle of optical fibers and its classification based on refractive index profile and mode of propagation with their applications. To explain the concept of dielectric constant and polarization in dielectric materials and summarize Gauss's law in the presence of dielectrics. and classify the magnetic materials based on magnetic susceptibility and their temperature dependence.
CO3:	To study the Schrödinger equation for standard systems with both analytical and numerical methods, and then interpret the results. And to explain the physical significance of elementary particles and atoms in different systems based on quantum mechanics
CO4:	To classify the energy bands of semiconductors and outline the properties of n-type and p-type semiconductors

Syllabus:

UNIT –I

WAVE OPTICS

INTERFERENCE: Introduction - Principle of Superposition- Interference in thin films (reflected light) - Newton's Rings – Engineering Applications

DIFFRACTION: Introduction – Types of Diffractions – Fraunhofer Single slit Diffraction (Quantitative) – Double Slit - N slits/Grating (Qualitatively) – Grating Formula – Rayleigh Criterion - Resolving power of grating

POLARIZATION: Introduction - Types of Polarization (plane, circular, elliptical) – Experimental Production of polarized light by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates

UNIT –II 8

Laser

Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation
Einstein's coefficients – Pumping schemes – Population inversion – Three level system and
meta stable state - Ruby Laser – He-Ne laser - Applications of lasers.

Fiber Optics

Introduction - Principle and structure of Optical Fibers - Acceptance angle - Numerical
Aperture - Classification of optical fibers based on Refractive index profile and mode
Applications of the optical fibers

UNIT –III 9

DIELECTRICS PROPERTIES

Introduction - Electric polarization - Dielectric polarizability, Susceptibility and Dielectric
constant- Types of dielectric polarizations – Electronic, Ionic, Orientational & Space Charge
(Qualitatively) – Internal Field (or) Local field in solids - Clausius-Mosotti equation
Ferroelectrics (Qualitatively)

MAGNETIC PROPERTIES

Introduction - Magnetic dipole moment-Magnetization-Magnetic susceptibility - Magnetic
permeability- Origin of permanent magnetic moment -Classification of Magnetic materials
(Dia, Para, Ferro/Ferri/Antiferro) with regard to temperature and field - Weiss ferromagnetic
domain theory (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites

UNIT –IV 10h

QUANTUM MECHANICS:

Introduction to matter waves – Davison and Germer Experiment - Heisenberg's Uncertainty
Principle – Pauli's exclusion principle – Wave Function - Schrodinger Time Independent &
Time Dependent wave equations - Particle in a box

FREE ELECTRON THEORY:

Classical free electron theory – Merits and Demerits - Density of states – Fermi Energy -
Fermi Distribution Function – Quantum free electron theory – Electrical Conductivity

UNIT –V 1

Band Theory of Solids:

Introduction - Bloch's theorem (Qualitatively) – Kronig Penny model – Origin of Energy
Bands – Effective mass & band gap – Demarcation of band gap for metals, insulators,
semiconductors – Concept of Hole

Semiconductor Physics:

Introduction – Density of carriers in Intrinsic and Extrinsic Semiconductors-Drift, Diffusion
& Mobility - Einstein's equation – Hall effect

Text books

1. MR. Srinivasan, "Engineering Physics", New Age International Publishers, 2011.
2. D. Thirupathi Naidu, M. Veeranjanevulu, "Engineering Physics", Techno Series, 2019.
3. P. K. Palanisamy, "Applied Physics", Sci-tech Publications.
4. A.J.Decker, "Solid State Physics", M. Man.
5. M. N. Avadhanlu, P. G. Kshirasagar "A Text book of Engineering Physics", S. Chand Publications, 2017.

Reference Books

1. Principles of Physics by Resnick, Halliday, and Walker, Printice Hall Publications
2. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata Mc GrawHill ,2008
3. S. Mze "Semiconductor devices -Physics and Technology"-Wiley,2008
4. H. K. Mik and A. K. Singh "Engineering Physics", McGraw Hill Publishing Company Ltd, 2018.

Web Links:

1. <https://www.britannica.com/science/interference-physics>
2. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

CO-PO Mapping:

1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	1	2	2	-	-	2	1	1
CO2	2	2	2	1	2	1	2	1	2	-	2	2
CO3	2	3	2	1	2	2	-	2	2	1	2	1
CO4	2	3	2	1	-	2	1	2	2	2	1	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech I Sem.			
Course Code	FUNDAMENTALS OF DIGITAL ELECTRONICS CSE (AI & ML)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Number systems		3	0	0	3

Course Objective(s):

- Understand the concepts of Binary system and conversions.
- Be familiar with the concepts of logical functions using Boolean algebra
- Learn various combinational circuits.
- Understand the functionality of flip flops and design of sequential circuits.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Understand various number systems, conversions, range and error detecting and Correcting codes and their significance.

CO-2: Evaluate the minimization of logic gates using Boolean algebraic principles.

CO-3: Evaluate the minimization of Boolean algebra using K-maps.

CO-4: Design various simple and complex combinational circuits with real time applications.

CO-5: Analyze the basic principles behind Flip flops and the design of sequential circuits with real time applications.

UNIT-1

Number Systems: Binary, Octal, Hex Decimal, and Conversions, Range; Binary additions and subtractions (using 1's, and 2's), concept of overflow; representations of negative numbers using 1's and 2's complement and range; BCD numbers: Representation of 8421, 2421, Ex-3, Gray and self-complementary codes; additions and subtractions on 8421 codes; Error detecting codes: even, odd parity.

UNIT-2

Logic Gates and Boolean Algebra: Boolean Algebra and Digital Logic GATES, Basic Boolean Laws and properties; Boolean functions; canonical and standard forms (SOP, POS); Error correcting codes: hamming codes, block parity codes.

UNIT-3

Combinational Logic Circuits: Definition of combinational circuits, design procedure for half, full, decimal (8421), Gate minimization using three and four variable K-Map's with and without don't cares.

UNIT-4

Adders and Subtractors; Combinational Circuit Design for BCD code converters; Encoders, Decoders, Multiplexers, D-Multiplexers.

UNIT-5

Sequential Logic Circuits: Classification of Sequential circuits, latches, Flip Flops with truth tables and excitation tables, Registers and Different types of registers-shift register, bi-directional shift register.

Text Books

1. “Digital Design” – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. “Digital Logic and Computer Organization”, V Rajaraman, T. Radhakrishnan, PHI, 2009.

Reference Books

1. “Switching and Finite Automata Theory”, 3/e, Kohavi, Jha, Cambridge.
2. Digital Logic Design, Leach, Malvino, Saha, TMH
3. Modern Digital Electronics, R.P. Jain, TMH

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech II SEM.			
Course Code	DATA STRUCTURES CSE (AI & ML)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics and C Language		3	0	0	3

Course Objective(s):

- Be familiar with basic techniques of algorithm analysis.
- Be familiar with writing recursive methods
- Be familiar with several sub-quadratic sorting algorithms including quick sort and merge sort
- Master the implementation of data structures such as stacks and queues.
- Master the implementation of linked data structures such as linked lists , graphs and binary trees
- Comprehensive knowledge of data structures and ability to implement the same in Software applications

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: To be able to choose appropriate data structure as applied to specified problem definition.

CO-2: To be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

CO-3: To be able to apply concepts learned in various domains like DBMS, compiler construction.

CO-4: To be able to use linear and non-linear data structures like stacks, queues, linked list etc.

UNIT-1

Data structure- Definition, types of data structures

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence.

Preliminaries of algorithm, Algorithm analysis and complexity.

Searching Techniques: Linear Search, Binary Search and Fibonacci Search.

Sorting Techniques: Insertion sort, selection sort, exchange-bubble sort, quick sort and merge sort Algorithms.

UNIT-2

Stacks: Basic Stack Operations, Representation of a Stack using Arrays,

Applications of Stack: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

UNIT-3

Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack.

Applications of Queues: Circular Queues, De-queue, Priority Queues.

UNIT-4

Linked Lists: Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, reversing a single linked list, Circular linked list and Double linked list.

UNIT-5

Trees-Binary Trees, terminology, representation and traversals-pre, post & in order traversals.

Graphs- terminology, representation and traversals (BFS&DFS).

Text Books

1. Data Structures with C, Seymour Lipschutz, Schaum's Outlines, TMH-special 2nd Edition
2. Data structures using C, 2nd Edition, ReemaThareja, Oxford higher education.

Reference Books

4. Data structures: A Pseudo code Approach with C, 2nd edition, R.F.Gilberg and B.A.Forouzan, Cengage Learning
5. Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI.
6. Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson.
7. Data Structures using C, A.M.Tanenbaum, Y. Langsam, M.J.Augenstein, Pearson.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No

Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2 semester)			
Course Code	PYTHON PROGRAMMING CSE (AI & ML)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Knowledge of any programming language		3	0	0	3

Course Objective(s):

- Acquire knowledge on different data structures technique.
- To develop solutions for problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

Course Outcomes:

On completion of the course, the students will be able to-

CO-1: Handle different data structures.

CO-2: understand the use of control statements, function overloading, operator overloading in real time application

CO-3: Implement files using various file operations.

UNIT-1

Introduction to Python: History Features, Installing Python, Running Python, Comments, Operators, Identifiers, Variables, Indentation, Data Types: Initializing values to variables, Multiple assignment, Multiple statement in a single line.

UNIT-2

Types and Expressions: Types: Integers, Booleans, Strings. Expressions and order of evaluation control flow of Conditional Statements: if-statement, if-else statement, Nested-if statement, if-elif-else statement, Loops: for, while, Nested loops, Break statement, continue statement and Pass statement.

UNIT-3

Data Structures and Files: Data structures: Lists- operations, Slicing, Methods, Cloning. Tuples- creating tuple, updating, utility of tuples, Methods. Sets- creating. Dictionaries-creating, accessing values, modifying, deleting sorting, nested dictionaries. Sequences, Files-opening and closing Files, reading and writing files, File positions.

UNIT-4

Errors and Exception: Errors- Introductions to errors and Exception, Handling Exceptions, Multiple Except blocks.

Functions: Functions declaration, defination, function call, function parameters, variable scope, return statement, Lambda function, Anonymous functions.

Modules: Modules- import statement, name of modules, Making own module, python module.

UNIT-5

Object oriented programming: Object oriented programming- Class and objects, class method, self argument, __init__() method, __del__() method, public and private data member, class methods and static methods in Python, Regular expressions- match(), search(), sub(), findall() and finditer() function.

Text Books

1. Wesley J. Chun "Core Python Programming" Prentice Hall
2. Head First Python, 2nd Edition

Reference Books

1. Mark Lutz "Programming Python, 4th Edit O'ReillyMedia
2. David Beazley and Brian K. Jones"PythonCokboo'Reilly

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	1	-	-	-	-	-	-	-
CO2	3	1	-	-	2	-	-	-	-	-	-	-
CO3	-	2	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2 semester)			
Course Code	PYTHON PROGRAMMING CSE (AI & ML)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Knowledge of any programming language		3	0	0	3

Course Objective(s):

- Acquire knowledge on different data structures technique.
- To develop solutions for problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

Course Outcomes:

On completion of the course, the students will be able to-

CO-4: Handle different data structures.

CO-5: understand the use of control statements, function overloading, operator overloading in real time application

CO-6: Implement files using various file operations.

UNIT-1

Introduction to Python: History Features, Installing Python, Running Python, Comments, Operators, Identifiers, Variables, Indentation, Data Types: Initializing values to variables, Multiple assignment, Multiple statement in a single line.

UNIT-2

Types and Expressions: Types: Integers, Booleans, Strings. Expressions and order of evaluation control flow of Conditional Statements: if-statement, if-else statement, Nested-if statement, if-elif-else statement, Loops: for, while, Nested loops, Break statement, continue statement and Pass statement.

UNIT-3

Data Structures and Files: Data structures: Lists- operations, Slicing, Methods, Cloning. Tuples- creating tuple, updating, utility of tuples, Methods. Sets- creating. Dictionaries-creating, accessing values, modifying, deleting sorting, nested dictionaries. Sequences, Files-opening and closing Files, reading and writing files, File positions.

UNIT-4

Errors and Exception: Errors- Introductions to errors and Exception, Handling Exceptions, Multiple Except blocks.

Functions: Functions declaration, defination, function call, function parameters, variable scope, return statement, Lambada function, Anonymous functions.

Modules: Modules- import statement, name of modules, Making own module, python module.

UNIT-5

Object oriented programming: Object oriented programming- Class and objects, class method, self argument, __init__() method, __del__() method, public and private data member, class methods and static methods in Python, Regular expressions- match(), search(), sub(), findall() and finditer() function.

Text Books

3. Wesley J. Chun "Core Python Programming" Prentice Hall
4. Head First Python, 2nd Edition

Reference Books

3. Mark Lutz "Programming Python, 4th Edit O'ReillyMedia
4. David Beazley and Brian K. Jones"PythonCokboo'Reilly

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	1	-	-	-	-	-	-	-
CO2	3	1	-	-	2	-	-	-	-	-	-	-
CO3	-	2	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech			
Course Code	APPLIED PHYSICS (For All Circuital Branches like ECE, EEE, CSE, CSE (AI & ML), CSE (Cyber Security) etc)				
Teaching	Total Contact Hours – 48h	L	T	P	C
		3	0	0	3

Course Objective

Physics Curriculum is re-oriented to the needs of all the branches of graduate engineering courses that serve as a transit to understand specific advanced topics.

Course Outcomes:

On Completion of the course, the students will be able	
CO1:	To impart knowledge of physical optical phenomenon like Interference, Diffraction and polarization involving design of optical instruments with higher resolution
CO2:	To demonstrate the concept on the absorption and spontaneous and stimulated emission in two level system and the conditions for laser amplification and explain the working principle of optical fibers and its classification based on refractive index profile and mode of propagation with their applications. To explain the concept of dielectric constant and polarization in dielectric materials and summarize Gauss's law in the presence of dielectrics. and classify the magnetic materials based on susceptibility and their temperature dependence.
CO3:	To study the Schrödinger equation for standard systems with both analytical and numerical methods, and then interpret the results. And to explain the physical states of elementary particles and atoms in different systems based on quantum mechanics
CO4:	To classify the energy bands of semiconductors and outline the properties of n-type and p-type semiconductors

Syllabus:

UNIT –I

WAVE OPTICS

INTERFERENCE: Introduction - Principle of Superposition- Interference in thin films(reflected light) - Newton's Rings – Engineering Applications

DIFFRACTION: Introduction – Types of Diffractions – Fraunhofer Single slit Diffraction (Quantitative) – Double Slit - N slits/Grating (Qualitatively) – Grating Formula – Rayleigh's Criterion - Resolving power of grating

POLARIZATION: Introduction - Types of Polarization (plane, circular, elliptical) – Experimental Production of polarized light by reflection, refraction and double refraction -Nicol's Prism - Half wave and Quarter wave plates

UNIT –II

Laser

Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of

radiation – Einstein's coefficients – Pumping schemes – Population inversion – Three level system and meta stable state - Ruby Laser – He-Ne laser - Applications of lasers.

Fiber Optics

Introduction - Principle and structure of Optical Fibers - Acceptance angle - Numerical Aperture - Classification of optical fibers based on Refractive index profile and modes – Applications of the optical fibers

UNIT –III

DIELECTRICS PROPERTIES

Introduction - Electric polarization - Dielectric polarizability, Susceptibility and Dielectric constant- Types of dielectric polarizations – Electronic, Ionic, Orientational & Space (Qualitatively) – Internal Field (or) Local field in solids - Claussius-Mosotti equation – Ferroelectrics (Qualitatively)

MAGNETIC PROPERTIES

Introduction - Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials (Dia, Para, Ferro/Ferri/Antiferro) with regard to temperature and field - Weiss ferromagnetic domain theory (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites

UNIT –IV

QUANTUM MECHANICS:

Introduction to matter waves – Davison and Germer Experiment - Heisenberg's Uncertainty Principle – Pauli's exclusion principle – Wave Function - Schrodinger Time Independent and Time Dependent wave equations - Particle in a box

FREE ELECTRON THEORY:

Classical free electron theory – Merits and Demerits - Density of states – Fermi Energy -Fermi Distribution Function – Quantum free electron theory – Electrical Conductivity

UNIT –V

Band Theory of Solids:

Introduction - Bloch's theorem (Qualitatively) – Kronig Penny model – Origin of Energy Bands – Effective mass & band gap – Demarcation of band gap for metals, insulators, semiconductors – Concept of Hole

Semiconductor Physics:

Introduction – Density of carriers in Intrinsic and Extrinsic Semiconductors-Drift, Diffusion & Mobility - Einstein's equation – Hall effect

Text books

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech II Sem.			
Course Code	DATA STRUCTURES LAB CSE (AI & ML)				
Teaching	Total contact hours-36	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics, Logical Ability		0	0	3	1.5

1. .MR. Srinivasan, "Engineering Physics", New Age International Publishers, 2011.
2. D. Thirupathi Naidu, M. Veeranjanyulu, "Engineering Physics", Techno Series, 2019.
3. P. K. Palanisamy, "Applied Physics", Sci-tech Publications.
4. A.J.Decker, "Solid State Physics", M Man.
5. M. N. Avadhanlu, P. G. Kshirasagar "A Text book of Engineering Physics", S. ChandPublications, 2017.

Reference Books

1. Principles of Physics by Resnick, Halliday, and Walker, Printice Hall Publications
2. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata Mc GrawHill ,2008
3. S.Mze "Semiconductor devices -Physics and Technology"-Wiley,2008
4. H. K. Mik and A. K. Singh "Engineering Physics", McGraw Hill Publishing Company Ltd, 2018.

Web Links:

1. <https://www.britannica.com/science/interference-physics>
2. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

CO-PO Mapping:

1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	1	2	2	-	-	2	1	1
CO2	2	2	2	1	2	1	2	1	2	-	2	2
CO3	2	3	2	1	2	2	-	2	2	1	2	1
CO4	2	3	2	1	-	2	1	2	2	2	1	-

Course Objective(s):

- To impact adequate knowledge on the python programming language.
- To develop the skills of programming for implementing object oriented concepts and data structures by using python programming language.
- To impact adequate knowledge on Data Structures
- To develop the skills of programming for implementing Data Structures.

Course Outcome(s):

After successful completion of this course, a student will be able to:

CO-1: Write the programs for mathematical functions using python programming language.

CO-2: Write programs for object oriented concepts and data structures.

- CO-3:** Choose appropriate data structure as applied to specified problem definition.
- CO-4:** Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- CO-5:** Apply concepts learned in various domains like DBMS, compiler construction etc.
- CO-6:** Use linear and non-linear data structures like stacks, queues, linked list etc.

Programs:

- 1) Write the program using python for the following
 - a) Implement a Python program that obtains the name from the user and prints the message "Hello Username, Welcome to the Python World!".
 - b) Implement a Python program to print all the prime numbers below n. n value should be taken from the user at the time of execution.
 - c) Find the biggest and smallest element in an array.
- 2) Write recursive program for the following using Python
 - a) Write recursive and non-recursive program for calculation of GCD (n, m)
 - b) Recursive function to perform Binary Search for a key value in a given list.
 - c) Recursive function to perform Linear Search for a key value in a given list.
- 3) Write a program using Python for the following
 - a) Insertion sort, to sort a given list of integers in ascending order
 - b) Selection sort to sort a given list of integers in ascending order
 - c) Bubble sort, to sort a given list of integers in ascending order
 - d) Quick sort, to sort a given list of integers in ascending order
 - e) Merge sort, to sort a given list of integers in ascending order
- 4) Write C program that implement
 - a) Stack (its operations) using arrays
 - b) Stack operations to convert infix expression into equivalent postfix expression
- 5) Write C program that implement
 - a) Queue (its operations) using arrays.
 - b) Circular queue (its operations) using arrays.
 - c) De-queue (its operations) using arrays.
- 6) Write a C program that uses functions to
 - a) Create a singly linked list
 - b) Perform insertion operations on a singly linked list
 - c) Perform deletion operations on a singly linked list

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. IISemester			
Course Code	COMMUNICATIVE ENGLISH LAB				
Teaching hours	Total Contact hours-48	L	T	P	C
Prerequisite(s) Learner should be equipped with Basic Language and Communication Skills like, Listening and Speaking which ensure Good Pronunciation and Ease in Communication		0	0	3	1.5

Course Objectives: This course aims to

- Adopt activity-based teaching-learning methods to ensure effective learning both in the classroom and laboratory sessions.
- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Explore the important language needs of the learner
- Build Language efficacy in both speaking and listening context

Course Outcomes: On Completion of the course, the students will be able to

CO1:	Learn to communicate in English
CO2:	Comprehend native speaker's accent.
CO3:	Speak appropriately in real life situations
CO4:	Display public speaking skills in the required context
CO5:	Handle different communicative situations

UNIT 1: BASIC AURAL AND ORAL SKILLS

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and other. **Speaking:** Phonetics-Accent and pronunciation

UNIT 2: CONVERSATIONAL SKILLS

Listening: Listening to audio texts, framing question in order to find out the gist of the unknown text. **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks

UNIT 3: LANGUAGE IN USE

Listening: Listening for global comprehension and summarizing. **Speaking:** Asking for Clarifications, Inviting others, Expressing Sympathy, Congratulating, Apologizing, Advising, Suggesting, Agreeing and Disagreeing.

UNIT 4: LANGUAGE APPPLICATOIN

Listening: Making predictions while listening to conversations/ transactional dialogues; listening to video and narrating the theme. **Speaking:** word stress-di-syllabic words, Poly-Syllabic words -Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

UNIT 5: INTERPRETATIONS

Listening: TED Talks – understanding the summary. **Speaking:** Formal oral presentations on topics from academic contexts and technical back ground. Giving formal explanations.

Lab Manual: INTERACT by Orient Black Swan

SOFTWARE: Cambridge –UNLOCK-2, English In Mind, Pronunciation Power, English grammar in Use

Reference Books:

1. English Pronunciation in use- Mark Hancock, Cambridge University Press
2. English Phonetics and Phonology-Peter Roach, Cambridge University Press.

WEB RESOURCES:

1. <https://www.usingenglish.com/comprehension>
2. <https://www.englishclub.com/reading/short-stories.htm>
3. <https://www.english-online.com>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	3	3	-	-	-	3
CO2	-	-	-	-	-	2	3	2	-	-	-	1
CO3	-	-	-	-	-	3	2	3	-	-	-	1
CO4	-	-	-	-	-	3	2	2	-	-	-	2
CO5	-	-	-	-	-	2	2	2	-	-	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech II SEM			
CourseCode	ENVIRONMENTAL SCIENCE (Common to All Branches)				
Teaching	Totalcontacthours-32h	L	T	P	C
Prerequisite(s): Knowledge of Environment Science		2	0	0	0

Course Objective: To bring in the students an awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and study the causes for pollution due to the day-to-day activities of human life, to save earth from the interventions by the engineers.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
CO2:	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities
CO3:	Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century
CO4:	Recognize the interconnectedness of human dependence on the earth's ecosystems
CO5:	Influence their society in proper utilization of goods and services.

Syllabus:

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable Energy resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – 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

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION: Definition: genetic, species and ecosystem diversity – 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 – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

ENVIRONMENTAL POLLUTION AND SOLID WASTE MANAGEMENT

Definition, Cause, effects and control measures of: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards
SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

SOCIAL ISSUES AND THE ENVIRONMENT

Urban problems – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – 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 – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – 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, etc.

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 of 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 Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.

Web Links:

1. <https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf>
2. https://www.tutorialspoint.com/environmental_studies/environmental_studies_tutorial.pdf
3. https://play.google.com/store/apps/details?id=com.techzone.higher.enviroment&hl=en_US

CO-PO Mapping:

(1: Slight [Low];
No Correlation)

2: Moderate[Medium];

3: Substantial[High],

4: Very High

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	3	1	2	2	3	2	3	3	1
CO2	3	2	3	2	3	2	3	2	3	3	3	2
CO3	3	2	3	2	3	2	3	2	3	3	3	1
CO4	2	3	3	2	1	3	2	3	2	3	3	2

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech I Semester			
Course Code	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE Common to CSE & CSM				
Teaching	Total contact hours: 48	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics		2	1	0	3

Course Objective(s):

- Construct simple mathematical proofs and possess the ability to verify them.
- Understand logical arguments and logical constructs.
- Get a better understanding of sets, functions, and relations.
- Acquire ability to describe computer programs in a formal mathematical manner.
- Solve counting problems involving the multiplication rule, permutations, and combinations.
- Work with graphs, and problems involved in the study of graphs.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-11: Understand the Logic Sets and Functions.

CO-12: Use mathematical reasoning techniques including induction and recursion

CO-13: Construct mathematical arguments using logical connectives and quantifiers.

CO-14: Verify the correctness of an argument using propositional and predicate logic and truth tables.

CO-15: Apply basic and advanced principles of counting

UNIT-1

Propositional Calculus: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautologies, equivalence of Formulas, Tautological Implications, Normal forms, Argument

Predicate Calculus: Predicative Logic, statement functions, variables and quantifiers, free & bound variables, inference theory of predicate calculus

UNIT-2

Set Theory: Introduction, Binary sets, operations on Binary sets, Principle of Inclusion and Exclusion.

Relations: Introduction, Properties of Binary Relations, Operations on Relations, Equivalence, Transitive closure, Compatibility Relations, Partial ordering Relations, Hasse diagram.

Functions: Introduction, Types of functions, Composition of functions, Inverse functions, Recursive functions, Pigeonhole principle.

UNIT-3

Graph Theory: Basic Concepts, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Types of Graphs, Isomorphism, Homomorphism.

Spanning Trees: Properties, Algorithms for Spanning trees, Minimum Spanning Tree

UNIT-4

Number Theory & Induction: Properties of integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

Algebraic Structures: Lattice-Properties, Lattices as Algebraic Systems, Algebraic Systems with one Binary Operation, Properties of Binary operations Groups: Abelian Group, Cosets, Subgroups (Definitions and Examples of all Structures)

UNIT-5

Binomial Theorem: Binomial and Multinomial Coefficients, Generating functions, Properties of Generating functions, The Principles of Inclusion – Exclusion.

Recurrence Relation: Recurrence Relations, Formulation as Recurrence Relations, Solving linear homogeneous recurrence Relations by substitution, generating functions and the Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations.

Text Books

1. Discrete Mathematics, Swapan Kumar chakraborty, Bikashkantisarkar, OXFORD.
2. Discrete Mathematical Structures with Applications to Computer Science, Tremblay, Manohar, TMH.

Reference Books

1. Discrete Mathematics, Proofs, Structures and applications, Rowan Garnier, John Taylor 3rd Ed, CRC Press
2. Discrete Mathematics, S.Santha, Cengage
3. Discrete Mathematics with Applications, Thomas Koshy, Elsevier

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	1	2		-	-	-	-	-	-	-
CO3	3	3	-	-	3	-	-	-	-	-	-	-
CO4	2	-	3	2	-	-	-	-	-	-	-	-
CO5	-	-	1	-	2	-	-	-	-	-	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)		II B.Tech I Semester			
	Course Code	DESIGN AND ANALYSIS OF ALGORITHMS Common to CSE, CSC & CSM					
	Teaching	Total contact hours: 48		L	T	P	C
	Prerequisite(s): Should have basic knowledge on algorithm design and Programming language concepts.			3	0	0	3

Objective(s):

➤ This course is intended to teach the students to analyze worst-case running times of algorithms using asymptotic analysis, describe various algorithm design situation and also explain the major graph algorithms and their analyses.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Analyze best and worst-case running times of algorithms

CO-2: Describe various algorithm design situation

CO-3: Design engineering problems

CO-4: Applying backtracking techniques in designing algorithms

CO-5: Applying branch and bound and NP completeness techniques in general problems.

Unit-1

Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis- space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, probabilistic analysis, Amortized analysis.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort

Unit-2

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, spanning trees, Minimum cost spanning trees, Single source shortest path problem.

Unit-3

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

Unit-4

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Unit-5

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem.

NP-Completeness: Complexity Classes P, NP, NP-hard and NP-complete, Clique decision problem, Node cover decision problem.

Text Books:

1. Introduction to Algorithms, second edition, T.H. Cormen, C.E. Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.

Reference Books

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA

3. Algorithm Design, Foundation, Analysis and internet Examples, Michel T Goodrich, Roberto Tamassia, Wiley

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	-	-	-	-	-	-	-	1	-	-	-
C02	-	-	1	-	-	-	-	-	-	-	-	-
C03	-	-	-	-	2	-	-	-	-	-	-	-
C04	-	-	1	-	2	-	-	3	-	-	-	-
C05	1	-	-	-	2	-	-	-	-	-	-	1

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech I Semester			
	Course Code	DATABASE MANAGEMENT SYSTEMS CSM				
	Teaching	Total contact hours: 48	L	T	P	C
	Prerequisite(s): ---		3	0	0	3

Objective(s):

- This course is intended to teach the students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.
- This course includes the logical design, physical design and implementation of relational databases.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Define a Database Management System

CO-2: Give a description of the Database Management structure and applications of Databases

CO-3: Know the advantages and disadvantages of the different models

CO-4: Compare relational model with the Structured Query Language (SQL)

CO-5: Know the constraints and controversies associated with relational Database model. know the rules guiding transaction ACID

UNIT-1

Introduction: Database System VS file System, Advantages of a DBMS View of Data, Data Abstraction, three-level schema structure instances and Schemas, , data types, table definitions, data Models, ER Model, Relational Model, Other Models, Database Languages: DDL, DML, DCL. Different types of data base Users and their responsibility.

UNIT-2

The Entity Relationship Model: Data base design and ER diagrams, Beyond ER Design Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Concept Design with the ER Model, and Conceptual Design for Large enterprises.

UNIT-3

Database Query Operation: DML operations- Procedural (selection, projection, set difference, Cartesian product, join) and non-procedural: domain and tuple calculus, DDL operations. Basic SQL querying (select and project) using where clause, sub queries, grouping, aggregation, ordering, implementation of different types of joins.

UNIT-4

Schema Refinement (Normalization): Purpose of Normalization, concept of functional dependency, normal forms based on functional dependency (1NF, 2NF and 3 NF), Boyce-Codd normal form (BCNF), Lossless join and dependency preserving decomposition, Fourth normal form (4NF).

UNIT-5

Transaction Management: Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point.

Storage and Indexing: Database file organization, file organization on disk, heap files and sorted files, hashing, single and multi-level indexes.

Text Books

1. Database System Concepts 6e By Abraham Silberschatz, Henry Korth and S Sudarshan

2. Database Management Systems, 3/e Raghuram Krishnan, Johannes Gehrke, TMH

Reference Books

1. Introduction to Database Systems, 8/e C J Date, PEA
2. The Database book principles & practice using Oracle/My Sql Narain Gehani, University Press.
3. Oracle Database 11g. The complete reference (oracle press)

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	1	2		-	-	-	-	-	-	-
CO3	3	3	-	-	3	-	-	-	-	-	-	-
CO4	2	-	3	2	-	-	-	-	-	-	-	-
CO5	3	2	2	-	3	-	-	-	-	-	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)				II B.Tech I Semester			
	Course Code	OBJECT ORIENTED PROGRAMMING THROUGH JAVA Common to CSE, CSM & CSC							
	Teaching	Total contact hours: 48				L	T	P	C
	Prerequisite(s): Basic knowledge of Logical Thinking, Programming and Object Oriented concepts					3	0	0	3

Objective(s):

- To perform Scripting languages to develop solutions to problems demonstrating usage of control structures, modularity, I/O.
- To demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of various scripting procedures
- To be able to apply object oriented techniques to solve bigger computing problems.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Learn the structure of Java Program and its applications

CO-2: Develop a software/application using Java Programming language

CO-3: Synthesize the give problem and implement it in Java

CO-4: Choose an engineering approach to solve problems using Java

CO-5: Develop interactive programs using applets.

UNIT-1

Java Basics: History of JAVA, Java Virtual Machine, Java Features, Program structures. Variables, Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals, Primitive Type Conversion and Casting, Flow of control-Branching, Conditional, loops.

Classes and Objects: classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, Garbage collector, Static keyword, this keyword, Arrays, Command line arguments.

UNIT-2

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class.

Interfaces & Packages: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java. Lang package.

UNIT-3

Exceptions & Assertions - Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception.

Multithreading: java.lang. Thread, the main Thread, Creation of new threads, Thread priority, Multithreading- Using is Alive () and join (), Synchronization.

UNIT-4

Java Collections: Introduction to Java Collections: Collection Framework: Interfaces, Implementation Classes, Java Collection API Interfaces: Collection Interface, Iterator Interface, Set Interface, Map Interface, List Interface, Queue Interface, Dequeue Interface, ListIterator Interface, sortedSet Interface, sortedMap Interface.

UNIT-5

Applets: Applet, Applet class, Applet Life Cycle, Applet Structure, getting Applet Parameters. **Event Handling:** Displaying Images, Playing Audio, designing calculator Applet.

Text Books

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.

Reference Books

1. Programming in Java E.BalaguruSamy.
2. JAVA Programming, K.Rajkumar.Pearson
3. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
4. Core JAVA for Beginners, RashmiKanta Das, Vikas.
5. Object Oriented Programming Through Java, P. Radha Krishna, Universities Press

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	1	-	-	-	-	-	-	-
CO2	2	2	-	-		-	-	-	-	-	-	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-
CO4	-	3	2	-	3	-	-	-	-	-	-	-
CO5	1	-	-	-	2	-	-	-	-	-	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech I Semester			
	Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS Common to CSE, CSM & CSC				
	Teaching	Total contact hours: 48	L	T	P	C
	Prerequisite(s): Basic knowledge of Logical Thinking, Programming and Object Oriented concepts		3	0	0	3

Objectives:

1. The aim of this is to equip the students with fundamental concepts of economics, budgeting, management & accounting.
2. It helps them to understand the Intricacies of business units.
3. The study of this subject strengthens them to start an enterprise on their own accord.
4. To impart the knowledge on how to make Financial Analysis on the business organizations.
5. To make the students to know about what is capital? And capital budgeting.

Course Outcomes:

After successful completion of this course, a student will be able to-

CO-6: Evaluate the economic theories, cost concepts and pricing policies

CO-7: Understand the market structures and integration concepts

CO-8: Understand accounting systems and analyze financial statements using ratio analysis

CO-9: Understand the measures of national income, the functions of banks and concepts of Globalization

CO-10: Apply the concepts of financial management for project appraisal

Unit- I

(To understand the concept ;and nature of Managerial Economics and its relationship with other disciplines, concepts of Demand and Demand forecasting for Proper Production Planning.)

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope – Managerial Economics and its relation with other subjects – Concepts of Demand – Types – Determinants, Law of Demand its Exception – Elasticity of Demand – Types and Measurement - Demand forecasting and its methods.

Unit-II

(To understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost – Volume – Profit Analysis.)

Production and Cost Analysis:

Production function Isoquants and Isocosts – Law of Variable proportions – Cobb-Douglas Production function- Economies of Scale- Cost Concepts-Opportunity Cost-Fixed Vs Variable Costs – Explicit Cost Vs Implicit Costs – Out of Pocket Costs Vs Imputed Costs – Cost Volume Profit Analysis- Determination of Break-Even Point (Simple Problems)

Unit-III

(To understand the nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods.)

Introduction to Markets, Theories of the Firm and Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, And Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

Unit- IV

(To know the different forms of Business Organization and their Merits and Demerits both Public and Private Enterprises and the concepts of Business Cycles and to understand the concept of Capital, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods.)

Types of Business Organizations and Business Cycles:

Features and Evaluation of Sole trader – Partnership – Joint Stock Company – State / Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

Capital, Capital Budgeting:

Capital, Significance of Capital, Sources of Finance (Capital) - Meaning of Capital Budgeting Need for Capital Budgeting - Techniques of Capital Budgeting - Traditional and Modern Methods.

Unit- V

(To understand the different Accounting Systems preparation of Financial Statements and uses of Different tools for performance evaluation.)

Introduction to Financial Accounts:

Introduction to Double Entry Systems, Preparation of Journal – Subsidiary Books- Ledger-Cash Book-Trial Balance- Preparation of Financial Statements, Analysis of Financial Statements through Ratio Analysis (Simple Problems).

TEXT BOOKS:

1. Prof. J.V. Prabhakara Rao, Prof.P. Venkata Rao. “Managerial Economics and Financial Analysis”, Ravindra Publication.
2. Dr.A.R.Aryasri- Managerial Economics and Financial Analysis – TMH Publications.
3. Dr.N.Appa Rao, Dr.P. Vijay Kumar ‘Managerial Economics and Financial Analysis”, Cengage Publications New Delhi

Reference:

1. Dr.B. Kuberudu and Dr.T.V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House.

CO-PO Mapping:

2. (1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	1	-	-	-	-	-	-	-
CO2	-	2	-	-		-	-	-	-	-	-	-
CO3	-	1	-	-	3	-	-	-	-	-	-	-
CO4	-	-	2	-	3	-	-	-	-	-	-	-
CO5	-	1	-	-	2	-	-	-	-	-	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech I Semesters			
	Course Code	DATABASE MANAGEMENT SYSTEMSLAB CSM				
	Teaching	Total contact hours: 48	L	T	P	C
	Prerequisite(s): ---		0	0	3	1.5

Objective(s):

- This course is intended to teach the student database design. To impart the knowledge of Querying the database. To brief the PL/SQL and its applications to the learners.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-6: Create Database tables incorporating various constraints.

CO-7: Access the Database using Queries and sub-Queries.

CO-8: Implement PL/SQL Programs, Cursors and Triggers.

CO-9: Apply Normalization to the database tables.

Lab Experiments

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, Constraints.
Example: - Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING, Join and Creation and dropping of Views.
4. Queries using Conversion functions (TO_CHAR, TO_NUMBER AND TO_DATE), STRING FUNCTIONS (CONCATENATION, LPAD, RPAD, LTRIM, RTRIM, LOWER, UPPER, INITCAP, LENGTH, SUBSTR AND INSTR), DATE FUNCTIONS (SYSDATE, NEXT_DAY, ADD_MONTHS, LAST_DAY, MONTHS_BETWEEN, LEAST, GREATEST, TRUNC, ROUND, TO_CHAR, TO_DATE)
5. Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
6. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
7. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
8. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT – IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.
9. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
10. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
11. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech I Semester			
Course Code	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB Common to CSE, CSM & CSC				
Practice	Total contact hours: 48	L	T	P	C
Prerequisite(s): Basic of any Programming language and OOPS concepts		0	0	3	1.5

12. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

13. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

14. Implement the normalization concept by using a particular relation/Table

15. Convert any database table into 3NF

Reference Books

4. Introduction to Database Systems, 8/e C J Date, PEA
5. The Database book principles & practice using Oracle/My SqlNarainGehani, University Press.
6. Oracle Database 11g. The complete reference (oracle press)

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	1	2		-	-	-	-	-	-	-
CO3	3	3	-	-	3	-	-	-	-	-	-	-
CO4	2	-	3	2	-	-	-	-	-	-	-	-

Course Objective(s):

- This course is intended to teach the Java programming language.
- To develop the skills of programming for Object oriented concepts.

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-11:** Write programs for solving real world problems using java collection frame
- CO-12:** Write programs using abstract classes
- CO-13:** Write multithreaded programs
- CO-14:** Write GUI programs using event handling in Java
- CO-15:** Write programs using applet.

List of Experiments:

1. Write a JAVA program to display default value of all primitive data types of JAVA
2. Write a JAVA program that displays the roots of a quadratic equation $ax^2+bx+c=0$. Calculate the discriminate D and basing on the value of D, describe the nature of roots.
3. Write a JAVA program to display the Fibonacci sequence.

4. Write a JAVA program give example for command line arguments.
5. Write a JAVA program to give the example for 'this' operator. And also use 'this' keyword as return statement.
6. Write a JAVA program to demonstrate static variables, methods, and blocks.
7. Write a JAVA program to search for an element in a given list of elements (linear search).
8. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
9. Write a JAVA program to sort given list of numbers.
10. Write a JAVA program to sort an array of strings
11. Write a JAVA program to check whether given string is palindrome or not.
12. Write a JAVA program to determine the addition of two matrices.
13. Write a JAVA program to determine multiplication of two matrices.
14. Write a JAVA program for the following
 - a. Example for call by value.
 - b. Example for call by reference.
15. Write a JAVA program that illustrates simple inheritance.
16. Write a JAVA program that illustrates multi-level inheritance
17. Write a JAVA program demonstrating the difference between method overloading and method overriding.
18. Write a JAVA program demonstrating the difference between method overloading and constructor overloading.
19. Write a JAVA program to give the example for 'super' keyword.
20. Write a JAVA program illustrating multiple inheritance using interfaces.
21. Write a JAVA program to illustrate the concept of final keyword in the program.
22. Write a JAVA program to create a package named pl and implement this package in ex1 class.
23. Write a JAVA program to create a package named my pack and import it in circle class.
24. Write a JAVA program to give a simple example for abstract class.
25. Write a JAVA program that describes exception handling mechanism.
26. Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.
27. Write a JAVA program to illustrate sub class exception precedence over base class.
28. Write a JAVA program for handling of user defined exception by using throw.
29. Write a JAVA program to illustrate the concept of throws keyword.
30. Write a JAVA program to illustrate creation of threads using runnable class.(start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).
31. Write a JAVA program to create a class My Thread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently
32. Write a JAVA program to illustrate the concept of thread synchronization.
33. Write Java program by implementing the concepts of different collections as list, map and set
34. Write a JAVA program that describes the life cycle of an Applet.
35. Write a JAVA program to design a laughing baby face.
36. Write a JAVA program to create a simple calculator.

References:

- <https://www.tutorialspoint.com/java/index.htm>
- <https://www.javatpoint.com/>
- <https://www.geeksforgeeks.org/java/?ref=ghm>

• CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	2	-	-	-	-	-	-	-

CO2	-	2	-	-		-	-	-	-	-	-	-
CO3	1	2	-	-	3	-	-	-	-	-	-	-
CO4	-	1	2	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	2	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Semester			
Course Code	LINUX AND SHELL PROGRAMMING LAB Common to CSE, CSM & CSC				
Practice	Total contact hours – 36	L	T	P	C
Prerequisite(s): Knowledge of computing fundamentals		0	0	3	1.5

Course Objective(s):

➤ The objective of this lab is to solve problems using shell scripts and to implement some standard Linux utilities

Course Outcomes:

- CO-1:** Ability to understand the Linux environment.
CO-2: Understand the basic command of Linux operating systems and write shell scripts
CO-3: Ability to perform the file management and multiple tasks using shell
CO-4: Write programs on important Linux library functions and system calls.
CO-5: Apply administrative functions on Linux operating system

List of Experiments:

- Study of general purpose utility commands of Linux.
- Installation, Configuration & Customizations of Linux.
- Study of vi editor execute shell commands through vi editor
- Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.
- Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.
- Write a shell script that determines the period for which a specified user is working on the system.
- Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
- Write a shell script that accepts two integers as its arguments and computers the value of first number raised to the power of the second number.
- Given two files each of which contains names of students. Create a program to display only those names that are found on both the files.
- Create a program to find out the inode number of any desired file.
- Write a pipeline of commands, which displays on the monitor as well as saves the information about the number of users using the system at present on a file called users.ux.
- Write a shell script that computes the gross salary of a employee according to the following rules: The basic salary is entered interactively through the key board.
 - If basic salary is < 25000 then HRA =10% of the basic and DA =90% of the basic.
 - If basic salary is >=25000 then HRA =Rs500 and DA=98% of the basic.

13. Write a shell script that accepts any number of arguments and prints them in the reverse order.
14. Write a shell script to find the smallest of three numbers that are read from the keyboard.
15. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
16. Write a shell script that reports the logging in of a specified user within one minute after he/she logs in. The script automatically terminates if the specified user does not login during a specified period of time.

Additional Experiments:

1. Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:
 - i. File type
 - ii. Number of links
 - iii. Read, write and execute permissions
 - iv. Time of last access
2. Write a C programs that simulate the following Linux commands:
 - i) mv
 - ii) cp
 - iii) ls
3. Write a C program to illustrate concurrent execution of threads using threads library.
4. Write a C program that illustrate two processes communicating using shared memory.

Reference Books

1. Beginning Linux Programming, 4 Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
2. Advanced Unix Programming, N.B.VenkateswarUIU, BS Publications.
3. Unix and Shell Programming, M.G. Venkatesh Murthy, Pearson Education.
4. Unix Shells by Example, 4th Edition, Ellie Quigley, Pearson Education.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	1	-	-	-	-	-	-	-	2
CO2	-	2	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	1	-	2	-	-	-	-	-	-
CO4	-	2	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	1	-	-	2	-	-	-	-	1

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech I Semester			
	Course Code	WEB APPLICATION DEVELOPMENT USING FULL STACK FRONTEND DEVELOPMENT: MODULE-I Common to CSE, CSM & CSC				
	Teaching	Total contact hours: 32	L	T	P	C
	Prerequisite(s):	Knowledge in Programming, Scripting Languages	0	1	2	2

Objective(s):

➤ The objective of this lab is to provide understanding about the core concepts of frontend programming for web application

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Analyze a web page and identify its elements and attributes.

CO-2: Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet

CO-3: Implement MVC and responsive design to scale well across PC, Tablet and Mobile Phone

CO-4: Create web pages using HTML and Cascading Style Sheets.

CO-5: Develop websites with HTML and CSS

Perform experiments related to the following concepts:

A. HTML

- 1) Introduction to HTML
- 2) Browser's and HTML
- 3) Editor's Offline and Online
- 4) Tags, Attribute and Elements
- 5) Doctype Element
- 6) Comments
- 7) Headings, Paragraphs, and Formatting Text
- 8) Lists and Links
- 9) Images and Tables

B. CSS

- 1) Introduction CSS
- 2) Applying CSS to HTML
- 3) Selectors, Properties and Values
- 4) CSS Colors and Backgrounds
- 5) CSS Box Model
- 6) CSS Margins, Padding, and Borders
- 7) CSS Text and Font Properties
- 8) CSS General Topics

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	-	-	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	1	-	-	-

C03	-	3	3	-	2	-	-	-	-	-	-	-
C04	-	-	2	-	-	-	-	-	-	-	-	1
C05	-	1	-	-	-	1	-	-	-	2	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech I Semester			
	Course Code	CONSTITUTION OF INDIA Common to CSE, CSC & CSM				
	Teaching	Total contact hours: 32	L	T	P	C
	Prerequisite(s): Basic knowledge of fundamental Rights, Indian Constitution		2	0	0	---

Objective(s):

- 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

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Understand historical background of the constitution making and its importance for building a democratic India.

CO-2: Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

CO-3: Understand the value of the fundamental rights and duties for becoming good citizen of India.

CO-4: Analyze the decentralization of power between central, state and local self- government.

CO-5: 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

UNIT-1

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-2

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-3

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

UNIT-4

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-5

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

References:

4. Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt. Ltd.
5. Subash Kashyap, Indian Constitution, National Book Trust

6. J.A. Siwach, Dynamics of Indian Government & Politics

e-Resources:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	-	2	-	-	-	-
CO2	-	-	-	-	-	3	-	3	-	-	-	-
CO3	-	-	-	-	-	3	-	2	-	-	-	-
CO4	-	-	-	-	-	3	-	-	-	-	-	-
CO5	-	-	-	-	-	3	-	2	-	-	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)				II B.Tech II Semester			
	Course Code	STATISTICS WITH R PROGRAMMING Common to CSE, CSM & CSC							
	Teaching	Total contact hours: 48				L	T	P	C
	Prerequisite(s): Basic understanding of Programming language, Statistics and Probability						2	1	0

Objective(s):

- To learn data analysis and commands essential for R Programming
- To analyze data for the purpose of exploration using Descriptive and Inferential Statistics
- To write statistical techniques, program in R-Program Language and draws the conclusion
- To understand Probability and Sampling Distributions and learn the creative application of Linear Regression in multivariate context for predictive purpose

Course Outcome(s):

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

CO-1: Install, Code and Use R Programming Language in R Studio IDE to perform basic tasks on Vectors, Matrices and Data frames.

CO-2: Describe key terminologies, concepts and techniques employed in Statistical Analysis.

CO-3: Define, Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems

CO-4: Conduct and interpret a variety of Hypothesis Tests to aid Decision Making

CO-5: Understand, Analyze, Interpret Correlation and Regression to analyze the underlying relationships between different variables.

UNIT-1

Introduction to R: Vectors, Matrices, Arrays, Lists, Data frames, Basic arithmetic operations in R, Importing and Exporting files in R.

UNIT-2

Descriptive Statistics: Data classification, tabulation, frequency and graphic representation, measures of central tendency, measures of variation, quartiles and percentiles, moment generating functions, Skewness and Kurtosis, R Programming for mean, median, mode, variance and standard deviation

UNIT -3

Correlation and Regression: Scatter diagram, Karl Pearson's correlation coefficient, rank correlation, regression coefficients, regression lines, least square principles: straight line, parabola, exponential curves, power curve, R programming for correlation and regression

UNIT -4

Probability Theory: Random experiment, sample space, events, axiomatic definition of probability, addition theorem, multiplication theorem, Baye's theorem, applications

Probability Distribution with R: Random variable, discrete, continuous, Binomial, Poisson distribution, continuous distribution, Normal distribution, R commands for computing probability distribution.

UNIT -5

Sampling Distribution: Central limit theorem (without proof), point estimate and interval estimation, construction of confidence intervals using R.

Tests of Hypothesis and tests of Significance: Introduction to Hypothesis testing, Type I and Type II error, one tailed and two tailed test, Tests concerning one mean and two means for small and large samples, single proportion and two proportion tests. R programming Z test, T test, F test and Chi-square test, Analysis of variance for one way classification

Text Books

1. Probability and Statistics: Miller and John E Fraud, Prentice Hall of India
2. The Art of R programming: AK Verma, Cengage Learning.

Reference Books

1. The Art of R Programming, Norman Matloff, Cengage Learning
2. R for Everyone, Lander, Pearson
3. Ken Black, 2013, Business Statistics, New Delhi, Wiley.
4. Lee, Cheng. et al., 2013, Statistics for Business and Financial Economics, New York: Heidelberg Dordrecht.
5. Anderson, David R., Thomas A. Williams and Dennis J. Sweeney, 2012, Statistics for Business and Economics, New Delhi: South Western.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	1	2		-	-	-	-	-	-	-
CO3	-	3	-	-	3	-	-	-	-	-	-	-
CO4	2	-	3	2	-	-	-	-	-	-	-	-
CO5	-	2	-	-	3	-	-	-	-	-	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech II Semester			
	Course Code	FORMAL LANGUAGES AND AUTOMATA THEORY Common to CSE, CSM & CSC				
	Teaching	Total contact hours: 48	L	T	P	C
	Prerequisite(s): Fundamental knowledge of Discrete Mathematics		3	0	0	3

Objectives:

- To learn fundamentals of Regular and Context Free Grammars and Languages
- To understand the relation between Regular Language and Finite Automata and machines
- To understand the relation between Contexts free Languages, PDA and TM
- To learn how to design PDA

Course Outcomes:

By the end of the course students will be able to

- CO-1:** Classify machines by their power to recognize languages
- CO-2:** Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy
- CO-3:** Employ finite state machines to solve problems in computing
- CO-4:** Illustrate deterministic and non-deterministic machines
- CO-5:** Quote the hierarchy of problems arising in the computer science

UNIT-1

Introduction: Symbols, Alphabets, Strings, Languages, operations on Strings and Languages, Finite State Machine, Definitions, Model representation of a Finite Automata, Acceptance of Strings and Languages, Deterministic finite automaton (DFA) and Non-deterministic Finite Automaton (NFA), Transition diagrams and Language recognizers. (Proofs Not Required).

UNIT-2

Finite Automata: Acceptance of languages, Equivalence of NFA and DFA, NFA to DFA conversion, NFA with ϵ -transitions, Significance, Conversion of NFA with ϵ -transitions to NFA without ϵ -transitions, Minimization of finite automata, Equivalence between two DFA's.

UNIT-3

Regular Languages: Regular sets, Regular expressions, Operations and applications of regular expressions, Identity rules, Inter-Conversion of a given Regular Expression and Finite Automaton, Pumping Lemma for Regular Languages (Proofs Not Required)

Grammar Formalism: Regular grammars, Right linear and left linear grammars, Conversion from left linear to right linear grammars, Equivalence of regular grammar and finite automata, Inter-conversion. (Proofs Not Required).

UNIT-4

Context Free Grammars: Context free grammars and languages, Derivation trees, Leftmost and Rightmost derivation of strings and sentential forms Ambiguity, left recursion and left factoring in context free grammars, Minimization of context free grammars, Normal forms for context free grammars, Chomsky normal form, Greibach normal form, Pumping Lemma for Context Free Languages (Proofs Not Required).

Pushdown Automata: Definition, Graphical notation, Acceptance of context free language, Acceptance by final state and empty state and its equivalence, Equivalence of context free grammars and pushdown automata. Definition of Context Sensitive Grammar (CFG) (Proofs Not Required)

UNIT-5

Turing Machine

Chomsky hierarchy on Languages, Turing Machine, definition, model, Representation of Turing machines, Design of Turing machines, Types of Turing machines, Post Correspondence Problem-PCP, Decidable and Un-Decidable problems.

Text Books

1. “Introduction to Automata Theory Languages & Computation”, 3/e, Hopcroft, Ullman, PEA
2. “Introduction to Theory of Computation, 2/e”, Sipser, Thomson

Reference Books

1. “Theory of Computation”, Rajesh Shukla, Cengage, 2010
2. Theory of Computer Science, Automata languages and computation, 2/e, Mishra, Chandra shekaran, PHI
3. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	3	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	2	-	-	-	-	-	-	-
CO4	-	3	2	-	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech II Semester			
	Course Code	COMPUTER ORGANIZATION CSM				
	Teaching	Total contact hours: 48	L	T	P	C
	Prerequisite(s): Fundamentals of digital electronics and Number system		3	0	0	3

Objective(s):

- Provides the knowledge on Computer Arithmetic and Data Representations.
- Provides the knowledge on organization and design of a computer system
- Impacts the knowledge on processing unit and micro controllers
- Provides the knowledge on microprocessors.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Represent the data in various formats

CO-2: Perform various register operations

CO-3: Organize and design a computer system

CO-4: Perform logic operations and operations on microprocessors.

UNIT-1

Basic Structure of Computers: Computer Types, Functional Unit, Basic Operational Concepts, Bus Structures.

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation, other Binary Codes, Error Detection Codes.

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations.

UNIT-2

Register Transfer Language and Micro-Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.

UNIT-3

Basic Organisation and Design: Instruction Codes, Computer Register Computer Instructions, Timing and Control, Instruction Cycle, Memory – Reference Instructions, Input – Output and Interrupt, Design of Basic Computer, Design of Accumulator Logic.

UNIT-4

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

Micro Programmed Control: Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

UNIT-5

The Memory System: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Input-Out Devices: Peripheral Devices, Input – Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupts, Direct Memory Access.

Multiprocessors: Introduction, Characteristics of Multiprocessors, Interconnection Structures, Inter processor Arbitration.

Text Books

1. M. MorisMano, Computer Systems Organization, 3/e, Pearson Education Asia/ Prentice Hall of India, 2007
2. William Stallings, Computer Organization and Architecture, 9/e, Pearson Education Asia, 2013
3. Carl V. Hamacher, Zvonks G. Vranesic, Safea G .Zaky, Computer Organization, 5/e, McGraw Hill, 2008

Reference Books

1. Patterson, D. A., and Hennessy, J. L., Computer Organization and Design: The Hardware/Software Interface, Morgan Kaufmann Publishers Inc., 5/e, 2014

[illegible]

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech II Semester			
	Course Code	INTRODUCTION TO AI & ML CSM				
	Teaching	Total contact hours: 48	L	T	P	C
	Prerequisite(s): Basic understanding of Programming language, Discrete mathematics		3	0	0	3

Objective(s):

- To provide a strong foundation of fundamental concepts in Artificial Intelligence.
- To provide a basic exposition to the goals and methods of Artificial Intelligence.
- To provide fundamentals of machine learning

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Enumerate the history and foundations of Artificial Intelligence

CO-2: Apply the basic principles of AI in problem solving

CO-3: Choose the appropriate representation of Knowledge

CO-4: Enumerate the Perspectives and Issues in Machine Learning

CO-5: Identify issues in Decision Tree Learning

UNIT-1

Introduction: What Is AI?, The Foundations of Artificial Intelligence, The History of Artificial Intelligence, The State of the Art, Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT-2

Problem Solving: Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Local Search Algorithms and Optimization Problems, Searching with Nondeterministic Actions.

UNIT-3

Knowledge Representation: Knowledge-Based Agents, Logic, Propositional Logic: A Very Simple Logic, Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, The Internet Shopping World.

UNIT-4

Introduction to Machine Learning: Well-Posed Learning Problem, 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-5

Decision Tree Learning: Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm, Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

Text Books

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3rd Edition, Pearson
2. Tom M. Mitchell, Machine Learning, McGraw Hill Edition, 2013

Reference Books

1. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India, 2011
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill
3. David Poole and Alan Mackworth, “Artificial Intelligence: Foundations for Computational Agents”, Cambridge University Press 2010.
4. Trivedi, M.C., “A Classical Approach to Artificial Intelligence”, Khanna Publishing House, Delhi.
5. Christopher Bishop, Pattern Recognition and Machine Learning (PRML), Springer, 2007.
6. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning: From Theory to Algorithms (UML), Cambridge University Press, 2014.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

[illegible]

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech II Semester			
	Course Code	SOFTWARE ENGINEERING Common to CSE, CSM & CSC				
	Teaching	Total contact hours: 48	L	T	P	C
	Prerequisite(s): Basic knowledge about software and any programming Language, Process Models.		3	0	0	3

Objective(s):

- Knowledge of basic software engineering methods & practices, and their application.
- To impart knowledge on the basic principles of software development life cycle and different life cycle models.
- Know the Requirements, Design and coding process of the development process
- Know Testing concepts to produce quality software
- Understand the concept of software maintenance and types of maintenance

Course Outcome(s):

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

CO-1: Choose the type of life cycle model for developing the project

CO-2: Gather the appropriate requirements for the development process

CO-3: Make proper design and architecture for the development process based on requirements

CO-4: Code the project using basic principles and test it using various testing methodologies

CO-5: Maintain the project using various types of maintenance.

UNIT-1

Introduction to Software Engineering: Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges.

Software Processes: Software Process, Software development life cycle, Software Development Process Models.

UNIT-2

Requirements Engineering: Software Requirements, Requirements engineering Process- Requirements elicitation, Requirements Analysis, Structured Analysis, Data Oriented Analysis, object oriented Analysis, Prototyping Analysis, Requirements Specification, Requirements Validation, requirement Management.

UNIT-3

Software Design: Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Design Methodologies, Structured Design, Transform Vs Transaction Analysis.

Object-Oriented Design: Object oriented Analysis and Design Principles, Performing user interface design.

UNIT-4

Implementation: Coding Principles, Coding Process, Code verification, Code documentation

Software Testing: Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Usability Testing, Regression testing, Debugging approaches.

UNIT-5

Software Quality: Software Quality Factors, Verification & Validation, the Capability Maturity Model Integration.

Software Maintenance: Software maintenance, Maintenance Process Models, Reengineering activities.

Text Books

1. Software Engineering, concepts and practices, UgrasenSuman, Cengage learning
2. Software Engineering, 8/e, Sommerville, Pearson.
3. Software Engineering, 7/e , Roger S.Pressman , TMH

Reference Books

1. Software Engineering, A Precise approach, PankajJalote, Wiley
2. Software Engineering principles and practice, W S Jawadekar, TMH
3. Software Engineering concepts, R Fairley, TMH

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	3	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	2	-	-	-	-	-	-	-
CO4	-	3	2	-	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech II Semester			
	Course Code	R PROGRAMMING LAB Common to CSE, CSM & CSC				
	Practice	Total contact hours: 48	L	T	P	C
	Prerequisite(s): Basic understanding of Programming language, fundamental knowledge of Discrete Mathematics		0	0	3	1.5

Objective(s):

- Learn the Installation of R studio and R console.
- Understand the basic mathematical operations using R
- Learn the concepts of lists, Strings, Functions, Frames, Arrays.
- Learn to import various files in R

Course Outcomes:

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

CO-1: Install R studio and R console and import various packages.

CO-2: Perform calculations on basic mathematical operations.

CO-3: Implement basic concepts of R programming, and its different module that includes lists, Strings, Functions, Frames, Arrays.

CO-4: Importing the CSV files and perform operations.

CO-5: Implement the various statistical techniques using R.

1. Introduction to R

- a) Installing R console and R studio and showing differences for both.
- b) Importing and loading packages in R console and R studio.
- c) Built in Mathematical operations

2. Data Types in R – Vectors and Matrices.

- a) Numerical vectors: Find the Length, Mode, Max and Min, Sum of the vector, Sort the vector and locate an element in vector for the following:
 - a. Create numerical vectors A and B with 5 elements each
 - b. Create vector C with 5 elements starts with 2 and with an increment of 3.
 - c. Create a vector D which is equal to A+B
 - d. Create a vector E which is equal to A+C
 - e. Find the length of vector D
 - f. Find the mode of vector E
 - g. Create a vector F expression which is 2times vector D + 3 times vector E – 1
 - h. Find the Min & Max of vector F
 - i. Sort the vector F in descending order and save it in vector G.
 - j. Find the sum of elements in vector G.
- b) Create a vector of the values $e^{\cos(x)}$ at $x=3, 3.1, 3.2, \dots, 6$

3. Matrices

- a. Create a matrix A with elements starting from 1. Number of rows '3' and columns '4' and the elements should be in column.
- b. Create a matrix 'B' and the elements should be added in row wise.
- c. Find the element in 2nd row and 4th column of A
- d. Find the element in 3rd row and 1st column of A

- e. In matrix 'B', display all the elements in 1st row.
- f. In matrix 'B', display all the elements in 2nd column
- g. Create a matrix 'C' with four rows and three columns starting from 10 with an inc of 8.
- h. Create a matrix 'D', with 3 rows and three columns starting from 100, with an inc of 4.
- i. Create a matrix 'E' in which matrix 'D' is appended to below matrix 'C'.

4. Data Types in R –Arrays, Lists and DataFrames.

- a) Create an array with number of rows 2 and number of columns 3, number of matrices 2 Starting from 1 with an increment of 2. You can save it as Array A. Array B starting from 10, number of rows 3, number of columns 2, and number of matrices in Sequence.
- b) Find the dim (A) and dim (B)

5. Create a list containing a vector, a matrix and a list.

- a) Give names to the list
- b) Add element at the end of the list
- c) Remove the last element
- d) Update the 3rd element
- e) Merge the two lists

6. Import an EXCEL/CSV/XML file in R studio and find the following:

- a) Mean
- b) Median
- c) Mode
- d) Variance
- e) Standard Deviation

7. Write a R script to calculate the correlation between two variables. How to make scatter plots. Use the scatter plot to investigate the relationship between two variables.

8. Import an excel/CSV file and find the following statistics

- a) correlation coefficient
- b) Covariance

9. Study and implement the functions of R-Binomial Distribution: dbinom(), pbinom(), qbinom(), rbinom().

10. Study and Implement Normal Distribution in R Studio.

11. Functions in R

- a. Create a function to print squares of numbers in sequence.
- b. Create a function without an argument

12. Write a R- Code to

- a. Calculate the mean
- b. Calculate the standard error of the mean
- c. Find the t-score that corresponds to the confidence level
- d. Calculate the margin of error and construct the confidence interval

13. Study and Implement Z-Test in R studio.

14. Write R scripts to plot data in Pie Chart, Histograms and graphs.

Reference Books

6. The Art of R Programming, Norman Matloff, Cengage Learning
7. R for Everyone, Lander, Pearson

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	1	2	2	-	-	3	-	-	-	1
CO3	3	3	-	-	3	-	-	-	-	-	-	-
CO4	2	-	3	2	-	-	-	-	1	-	2	-
CO5	2	-	3	2	-	-	-	-	1	-	2	-

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)				II B.Tech II Semester			
	Course Code	INTRODUCTION TO AI & ML LAB CSM							
	Teaching	Total contact hours: 48				L	T	P	C
	Prerequisite(s): Basic knowledge of regression, python programming language					0	0	3	1.5

Objective(s):

- To provide a strong foundation of fundamental concepts in Artificial Intelligence.
- To provide a basic exposition to the goals and methods of Artificial Intelligence.
- To apply the techniques in applications which involve perceptron, reasoning and learning.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Apply the basic principles of AI in problem solving using LISP/PROLOG

CO-2: Implement different algorithms using LISP/PROLOG

CO-3: Develop an Expert System using JESS/PROLOG.

List of Experiments (Artificial Intelligence)

1. Implementation of DFS for water jug problem using LISP/PROLOG
2. Implementation of BFS for tic-tac-toe problem using LISP/PROLOG/Java
3. Implementation of TSP using heuristic approach using Java/LISP/Prolog
4. Implementation of Simulated Annealing Algorithm using LISP/PROLOG
5. Implementation of Hill-climbing to solve 8- Puzzle Problem
6. Implementation of Monkey Banana Problem using LISP/PROLOG

List of Experiments (Machine Learning)

Python Libraries required: Sklearn

Note: Standard datasets can be downloaded from UCI Machine Learning Repository

(<https://archive.ics.uci.edu/ml/datasets.php>)

1. Implement and demonstrate FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .csv file.
2. For a given set of training data examples stored in a .csv file, implement and demonstrate the candidate elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree classifier. Use appropriate dataset for building the decision tree and apply this knowledge to classify a new sample.
4. Write a program to demonstrate the working of Decision tree regressor. Use appropriate dataset for decision tree regressor.
5. Write a program to demonstrate the working of Random Forest classifier. Use appropriate dataset for Random Forest Classifier.
6. Write a program to demonstrate the working of Logistic Regression classifier. Use appropriate dataset for Logistic Regression

Reference:

- <https://www.javatpoint.com/artificial-intelligence-tutorial>
- https://www.tutorialspoint.com/artificial_intelligence/index.htm

- https://www.tutorialspoint.com/machine_learning/index.htm

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

[illegible]

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech II Semester			
	Course Code	SOFTWARE ENGINEERING LAB CSM				
	Teaching	Total contact hours: 48	L	T	P	C
	Prerequisite(s): Basic knowledge of Logical Thinking and basics of procedural oriented programming.		0	0	3	1.5

Objective(s):

- The objective of this lab is to acquire the generic software development skill through various stages of software life cycle and also to ensure the quality of software through software development with various protocol-based environment.

Course Outcome(s):

- CO-1:** Analyze and specify software requirements through a productive working relationship with various stakeholders of the project
- CO-2:** Prepare SRS document, design document, test cases and software configuration management and risk management related document.
- CO-3:** Develop function oriented and object-oriented software design using tools like rational rose.
- CO-4:** Use modern engineering tools necessary for software project management, estimations, time management and software reuse
- CO-5:** Generate test cases for software testing

- Perform the following, for the following experiments:
 - Do the Requirement Analysis and Prepare SRS
 - Draw E-R diagrams, DFD, CFD and structured charts for the project.
- Course Registration System
- Students Marks Analyzing System
- Online Ticket Reservation System
- Stock Maintenance
- Consider any application, using COCOMO model, estimate the effort.
- Consider any application, Calculate effort using FP oriented estimation model.
- Draw the UML Diagrams for the problem 1, 2, 3, 4.
- Design the test cases for e-Commerce application (Flipcart, Amazon)
- Design the test cases for a Mobile Application (Consider any example from App store)
- Design and Implement ATM system through UML Diagrams.

Software Tools and Versions

Rational rose

Reference Books

- Software Engineering, A Precise approach, Pankaj Jalote, Wiley
- Software Engineering principles and practice, W S Jawadekar, TMH
- Software Engineering concepts, R Fairley, TMH

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	-	-	-	3	-	-	-	-	-	-	1
C02	2	3	-	-	-	-	-	-	-	-	-	-
C03	3	3	-	-	2	-	-	-	1	-	-	-
C04	-	3	2	-	3	-	-	-	-	2	-	-
C05	3	3	3	-	3	-	-	-	-	-	-	1

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech II Semester			
	Course Code	WEB APPLICATION DEVELOPMENT : MODULE-2 Common to CSE, CSM & CSC				
	Practice	Total contact hours: 32	L	T	P	C
	Prerequisite(s): Knowledge in Programming		0	1	2	2

Objective(s):

- The objective of this lab is to build strong foundation of JavaScript which will help developer to apply JavaScript concepts for responsive web frontend development.
- Understand the various JavaScript programming concepts like variables, operators, conditional and loops.
- Understand concepts commonly used in dynamic language programming

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Develop of the major Web Application Tier- Client side development.

CO-2: Participate in the active development of cross-browser applications through JavaScript.

CO-3: Develop JavaScript applications that transition between states.

CO-4: Describe and utilize JavaScript programming concepts such as variables, arrays, conditionals, and loops.

CO-5: Deploy JavaScript code to solve practical web design problems.

Perform experiments related to the following concepts:

1. Introduction to JavaScript
2. Applying JavaScript (internal and external)
3. Understanding JS Syntax
4. Introduction to Document and Window Object
5. Variables and Operators
6. Data Types and Num Type Conversion
7. Math and String Manipulation
8. Objects and Arrays
9. Date and Time
10. Conditional Statements
11. Switch Case
12. Looping in JS
13. Functions

References:

- <https://www.tutorialspoint.com/javascript/index.htm>
- <https://www.geeksforgeeks.org/javascript-tutorial/>
- <https://www.javatpoint.com/javascript-tutorial>

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY(Autonomous)	III B.Tech. I Semester			
CourseCode	NATURAL LANGUAGE PROCESSING CSE (AI/ML)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Formal Languages and Automata Theory		3	0	0	3

Course Objective(s):

1. Introduces the fundamental concepts and techniques of natural language processing (NLP).
2. Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
3. The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.
4. Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

Course Outcome(s):

On completion of the course, the students will be able to-

CO-1: Demonstrate a given text with basic Language features.

CO-2: Explain a rule based system to tackle morphology/syntax of a language.

CO-3: To design an innovative application using NLP components.

CO-4: To design a tag set to be used for statistical processing for real- time applications.

CO-5: To compare and contrast the use of different statistical approaches for different types of NLP applications.

UNIT I

Introduction to Natural Language Processing: Introduction to NLP, Components of NLP, Applications of NLP, Challenges and Scope, Data Formats, NLP Pipeline, Text Processing, NLTK

UNIT II

Feature Engineering on Text Data: Feature Extraction, N-Gram, Bag-of-Words, Document-Term Matrix, Term Frequency-Inverse Document Frequency (TF-IDF), Levenshtein Distance, One-Hot Coding, Biological Neuron vs. Artificial Neuron, Neural Networks, Convolutional Neural Net (CNN), Word Embedding, Word2vec, Doc2vec Model, Topic Modeling, Latent Dirichlet Allocation (LDA), Word Analogies

UNIT III

Natural Language Understanding Techniques: Parts-of-Speech Tagging, Dependency Parsing, Constituency Parsing, Morphological Techniques, Named-Entity Recognition (NER), Coreference Resolution, Word-Sense Disambiguation, Document and Sentence Similarity, Document Indexing, Sentiment Analysis

UNIT IV

Natural Language Generation: Introduction to NLG, Retrieval-Based Model, Artificial Intelligence Markup Language (AIML), Generative-Based Model, Language Modeling, Sentence Correction.

NLP Libraries: Introduction to TextBlob, Introduction to Vocabulary, Polyglot, LUIS, NLTK Corpora, Comparison of Libraries.

UNIT V

Speech Recognition Techniques : Basic Concepts of Speech, Reading, Loading, and Processing the Voice Data, Creating Speech Model, Use Cases, Speech Libraries.

Discourse Analysis : Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm– Coreference Resolution .

Text Books:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, O'Reilly Media, 2009.

Reference	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech I Semester				Books:
	Course Code	NATURAL LANGUAGE PROCESSING LAB CSE (AI/ML)					
	Practical	Total contact hours: 48	L	T	P	C	
	Prerequisite(s): ---		0	0	3	1.5	

1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
2. Richard M Reese, —Natural Language Processing with Java, O'Reilly Media, 2015.
3. Nitin Indurkha and Fred J. Damerau, —Handbook of Natural Language Processing, Second, Chapman and Hall/CRC Press, 2010. Edition
4. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

Web Resources:

1. <https://web.stanford.edu/~jurafsky/slp3/ed3book.pdf>
2. [https://pages.ucsd.edu/~bakovic/compphon/Jurafsky,%20Martin.-Speech%20and%20Language%20Processing_%20An%20Introduction%20to%20Natural%20Language%20Processing%20\(2007\).pdf](https://pages.ucsd.edu/~bakovic/compphon/Jurafsky,%20Martin.-Speech%20and%20Language%20Processing_%20An%20Introduction%20to%20Natural%20Language%20Processing%20(2007).pdf)
3. <https://www.foo.be/cours/dess-20122013/b/Natural%20Language%20Processing%20with%20Python%20-%20O'Reilly2009.pdf>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	-	1	1	1	1	2	-	-	-	1	1
CO2	3	2	3	-	2	3	3	2	3	-	-	-	1	1
CO3	3	2	2	1	3	1	2	1	3	-	-	-	2	2
CO4	1	1	3	2	1	2	2	3	3	-	-	-	1	2
CO5	3	2	3	1	3	2	2	3	3	-	-	-	2	1

Course Objective(s)

1. Understand the various concepts of natural language processing along with their implementation using Python

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-1: Explore natural language processing (NLP) libraries in Python
- CO-2: Learn various techniques for implementing Text data
- CO-3: Understand how to use NLUT for text feature engineering
- CO-4: Develop applications related to NLP using Python
- CO-5: Determine text data through audio

Python Libraries: nltk, re, word2vec

List of Experiments

1. Demonstrate Natural Language Toolkit and NLTK Corpora
2. Implement Read and write .txt files to/from local drive
3. Implement Read and write .docx Files to/from local drive

4. Perform lemmatization and stemming using python library nltk.
5. Demonstrate Term Frequency- Inverse Document Frequency (TF - IDF) using python
6. Demonstrate word embeddings using word2vec.
7. Convert text to vectors (using term frequency) and apply cosine similarity to provide closeness among two text.
8. Implement Word Tokenization with Python regular expressions
9. Sentence Tokenizers:write a program to break the raw text into small chunks.
10. Stopword Removal:write a program to remove the word that occur commonly in the document.
11. Demonstrate Named Entity Recognition (NER)
12. Implement Text conversion using Python
13. Implementation of Text classification using Python
14. Design Confusion Matrix to identify accuracy
15. Embedding word and sentence: Write a program to identify the words which have same meaning
16. Automatic Paraphrasing of Texts:Write a program by taking a sentence as input and generate an equivalent sentence related to the one given as input.

Web References:

1. <https://www.analyticsvidhya.com/blog/2017/01/ultimate-guide-to-understand-implement-natural-languageprocessing-codes-in-python/>
2. https://datahack.analyticsvidhya.com/contest/languipedia-codefest-natural-language-processing1/?utm_source=ultimate-guide-to-understand-implement-natural-language-processing-codes-inpython&utm_medium=blog
3. <https://www.analyticsvidhya.com/blog/2018/07/hands-on-sentiment-analysis-dataset-python/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	2	1	2	-	-	-	-	2	-	-	1	2
CO2	2	-	2	-	-	1	-	-	-	-	-	-	1	1
CO3	-	-	-	3	2	-	1	-	-	-	-	-	2	1
CO4	1	2	-	-	3	1	-	-	-	1	-	-	2	1
CO5	-	3	2	3	-	-	-	-	-	2	-	-	1	1

Course	Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)				III B.Tech I Semester			
	Course Code 201CS502	COMPILER DESIGN CSE, CSE(AI/ML), CSE(Cyber Security)							
	Teaching	Total contact hours: 48				L	T	P	C
	Prerequisite(s): Discrete Mathematics, Formal Languages and Automata Theory					3	0	0	3

Objective(s):

1. Create an overall view of various types of translators, linkers, loaders, and phases of a compiler.
2. Learn syntax analysis is, various types of parsers especially the top down approach, bottom up parsers.
3. Learn intermediate code generation, type checking, the role of symbol table and its organization, Code generation, machine independent code optimization and instruction scheduling

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-6: Demonstrate phases in the design of compiler

CO-7: Organize Syntax Analysis, Top Down and LL(1) grammars

CO-8: Design Bottom Up Parsing and Construction of LR parsers

CO-9: Analyze synthesized, inherited attributes and syntax directed translation schemes

CO-10: Determine algorithms to generate code for a target machine

UNIT-1

Overview of language processing- pre-processors- compiler- assembler- interpreters, linkers & loaders - structure of a compiler- phases of a compiler.

Lexical Analysis- Role of Lexical Analysis- Lexical Analysis vs. Parsing- Token, patterns and Lexemes- Lexical Errors- Regular Expressions- Regular definitions for the language constructs- Strings, Sequences.

UNIT-2

Syntax Analysis- discussion on CFG, parse trees, Role of a parser-classification of parsing techniques- Brute force approach, left recursion, left factoring, Top down parsing- First and Follow- LL(1) Grammars, Non- Recursive predictive parsing.

UNIT-3

Bottom up Parsing-Approach and its types, Introduction to simple LR- Why LR Parsers- Model of an LR Parsers- Operator Precedence- Shift Reduce Parsing- Difference between LR and LL Parsers, Construction of SLR Tables.Construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity.

UNIT-4

Semantic Analysis, SDT Schemes, evaluation of semantic rules. Intermediate code, three address code, quadruples, triples.
Symbol tables: use and need of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data.

UNIT-5

Code Generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.

Text Books

1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman, 2nded, Pearson, 2007.

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech I Semester			
Course Code 201CS503	COMPUTER NETWORKS CSE, CSE(AI/ML), CSE(Cyber Security)				
Teaching	Total contact hours: 48	L	T	P	C
Prerequisite(s): Computer Organisation and Operating Systems		3	0	0	3

2. Compiler Design O.G.Kakde, Laxmi Publications 4th Edition, 2015

Reference Books

1. Engineering a compiler, 2nd edition, Keith D.Cooper& Linda Torczon, Morgan Kaufman.
2. <http://www.nptel.iitm.ac.in/downloads/106108052/>
3. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011.
4. Compiler construction, Principles and Practice, Kenneth C Loudon, CENGAGE
5. Implementations of Compiler, A new approach to Compilers including the algebraic methods, Yunlinsu, SPRINGER

Web Resource:

1. <http://nptel.ac.in/courses/106108052/1>(Prof. Y.N.Srikanth, IIScBangalore)

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	-	2	1	1	1	1	2	-	-	1	1
CO2	3	3	2	-	3	-	1	-	2	3	-	-	1	1
CO3	2	3	3	-	2	1	1	-	1	2	-	-	1	1
CO4	3	3	2	-	3	1	2	-	3	2	-	-	1	1
CO5	2	3	2	-	-	-	2	-	2	3	-	-	1	1

Course Objective(s):

1. Become familiar with layered communication architectures (OSI and TCP/IP).
2. Learn client/server model and key application layer protocols.
3. Detection of errors with parity, checksums, and CRC.

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-11:** The architectural principles of computer networking and compare different approaches to organizing networks.
- CO-12:** Familiarize with the Transmission Media, Flow Control and Error Detection & Correction
- CO-13:** Explain fundamentals and technologies of physical, data-link and network layers
- CO-14:** Fundamental concepts in Routing, Addressing & working of Transport Protocols.
- CO-15:** Gain familiarity with common networking & Application Protocols.

UNIT-1

Introduction: OSI model overview, TCP/IP and other networks models, Network Topologies, Network technologies (WAN, LAN, MAN), Physical layer: Transmission media (Guided, Wireless)

UNIT-2

Course	Course Code 201AI565A	OPERATING SYSTEMS CSE(AI/ML)							
	Teaching	Total contact hours: 48				L	T	P	C
	Prerequisite(s): Basic knowledge of peripheral devices					3	0	0	3

Objectives:

- Introduce the operating systems and generations.
- Define, explain, processes and threads, mutual exclusion, CPU scheduling.
- Understand about the Concurrency and Deadlocks
- Understand Memory Management and Secondary Storage (Disk) Mechanism
- Understand File Systems in Windows Operating System.

Course Outcomes:

By the end of the course students will be able to

CO-1: Describe various generations of Operating System and functions of Operating System

CO-2: Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance

CO-3: Solve Inter Process Communication problems using Mathematical Equations by various methods

CO-4: Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques

CO-5: Outline File Systems in Windows Operating System

UNIT-1

Computer System and Operating System Overview: Overview of computer operating system and its types, operating system structure, operating system operations, protection and security, services, systems calls, operating system generation.

UNIT-2

Process Management: Process concept- process scheduling, operations, Process scheduling criteria and algorithms: FCFS, SJF, Priority, Round Robin, and their evaluation, Multi Thread programming models, Inter process communication.

UNIT-3

Concurrency: Problems in Concurrency, Principles in Concurrency, Advantages of Concurrency, Issues of Concurrency. Process synchronization: Synchronization Hardware, Mutex Locks, the critical- section problem, Peterson's Solution, synchronization hardware, semaphores, classic problems of synchronization, Dining Philosophers problem, monitors.

Principles of Deadlock– System model, deadlock characterization, deadlock prevention, avoidance and detection, recovery from deadlock

UNIT-4

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation

Virtual Memory Management: Virtual memory, demand paging, page-Replacement algorithms: FIFO, LRU, LFU, Allocation of Frames, Thrashing.

UNIT-5

File System Interface- The concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

Mass-Storage Structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling (FCFS, SCAN, CSCAN, SSTF).

Text Books

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, John Wiley.
2. Operating Systems – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education.

Reference Books

1. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH



Regulation GRBT20	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech. III – I			
CourseCode	Principles of Management (Common to all Branches)				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basic Knowledge of Business Environment		3	0	0	3

Course Objectives:

- To help the students gain understanding of the functions and responsibilities of managers.
- To provide them tools and techniques to be used in the performance of the managerial job.
- To enable them to analyse and understand the environment of the organization.
- To help the students to develop cognizance of the importance of management principles.

Course Outcomes:

On Completion of the course, the students will be able to-

CO1:	Understand the concepts related to management and different schools of management thoughts.
CO2:	Apply the concepts of planning for effective management.
CO3:	Identify common organizational structures and the advantages and disadvantages
CO4:	Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities and recognize the importance of employee motivation and how to promote it.
CO5:	Analyze effective application of communication in managerial decisions.

(AUTONOMOUS)

Approved by AICTE, Accredited by NBA & NAAC 'A' Grade, Recognized under 2(f) and 12(b) of UGC, Permanently Affiliated to JNTUK, Kakinada.

UNIT I

Fundamentals of Management: The concept- meaning, nature and scope, importance of management. principles and functions of management- thoughts of management- managerial roles and skills- levels of management.

UNIT II

Planning&Decision Making: Nature and importance of planning- steps in planning process- Types of plans. Types of decisions – steps in decision making process– decision tree analysis – Management by Objective (MBO).

UNIT III

Organizing: Nature and purpose of organizing- Principles of organizing- Organization structures- line and staff organizations - Delegation of authority- span of control-centralization- decentralization of authority.

UNIT IV

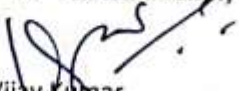
Staffing and Coordination: Importance of staffing, recruitment, selection, training and development concepts - factors in selecting lower, middle and upper-level managers. Need for coordination, Principles and techniques of coordination

UNIT V

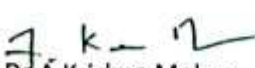
Motivation ,Communication and Controlling: Motivation- significance of motivation, theories of motivation, Leading-Leadership styles, theories, Communication- process of communication, types of communication, barriers, overcoming barriers to communication, effective communication and its requirements. Importance of controlling, steps in controlling process, requirements of effective control, tools and techniques of control

References:

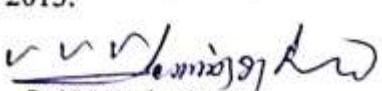
1. Harold Koontz, "Essentials of Management", 8th Ed., Tata McGraw- Hill Education, New Delhi, 2014
2. Ricky W. Griffin, "Management", Cengage Learning, New Delhi, 2014
3. Heinz Weilrich, Mark V. Cannice & Harold Koontz, Management a Global and Entrepreneurial
4. Dilip Kumar Battacharya, Principles of Management, Pearson, 2012.
5. Kumar, Rao, Chhaalill "Introduction to Management Science" Cengage Publications, New Delhi
6. V.S.P. Rao, Management Text and Cases, Excel, Second Edition, 2012.
7. K. Anbuvelan, Principles of Management, University Science Press, 2013.



Dr. M. Vijay Kumar
(BOS-Chairman)



Dr. A. Krishna Mohan
(V C Nominee)



Dr. V.V.Seshagiri Rao
(Industry Expert)

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY(Autonomous)	III B.Tech. I Semester			
CourseCode 201AI565A	DATA VISUALIZATION CSE (AI/ML)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Computer Graphics, Image Processing		3	0	0	3

Course Objective(s):

1. Familiarize students with the basic and advanced techniques of information visualization and scientific visualization
2. Learn key techniques of the visualization process
3. A detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques

Course Outcome(s):

On completion of the course, the students will be able to-

CO-6: Explain Visualization and representation of data

CO-7: Creating visual representations and visualization reference model of applications

CO-8: Classify the visualization systems in a data representation

CO-9: Identify Visualization of groups and trees

CO-10: Determine the visualization of volumetric different data sets in applications

UNIT-1

Introduction: What Is Visualization? History of Visualization, Relationship between Visualization and Other Fields. The Visualization Process, Introduction of visual perception, visual representation of data, Gestalt principles, information overloads.

UNIT-2

Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications

UNIT-3

Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.

UNIT-4

Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization

UNIT-5

Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, Evaluating visualizations Recent trends in various perception techniques, various visualization techniques, data structures used in data visualization.

Textbook:

1. WARD, GRINSTEIN, KEIM. Interactive Data Visualization: Foundations, Techniques, and Applications. Natick : A K Peters, Ltd.
2. E. Tufte, The Visual Display of Quantitative Information, Graphics Press.

Web Resources:

1. http://www.econ.upf.edu/~michael/visualdata/tufte-aesthetics_and_technique.pdf
2. https://kdd.cs.ksu.edu/Courses/CIS536/Lectures/Slides/Lecture-34-Main_6up.pdf
3. https://haralick.org/DV/Handbook_of_Data_Visualization.pdf

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	1	-	-	3	2	-	-	-	1	2	-	1	3
CO2	-	-	1	2	-	3	-	-	-	2	1	-	2	2
CO3	1	2		-	3	-	-	-	-	-	2	1	1	1
CO4	-	1	2	-	-	-	3	-	-	1	-	-	1	2
CO5	-	3	1	-	2	-	-	-	-	-	1	1	1	1

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY(Autonomous)	III B.Tech. I Semester			
CourseCode 201AI565A	DevOps CSE (AI/ML)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objective(s):

1. Introduces the basic concepts of Information System.
2. To understand The Management Control Framework and The Application Control Framework.

Course Outcome(s):

On completion of the course, the students will be able to-

- CO-11:** Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility.
- CO-12:** Describe DevOps & DevSecOps methodologies and their key concepts
- CO-13:** Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
- CO-14:** Set up complete private infrastructure using version control systems and CI/CD tools
- CO-15:** Acquire the knowledge of maturity model, Maturity Assessment

UNIT-1

Phases of Software Development Life Cycle, Values and principles of agile software development.

UNIT-2

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

UNIT-3

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

UNIT-4

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

UNIT-5

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

Text Books:

1. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.
2. What is Devops? Infrastructure as code, 1st Edition, Mike Loukides ,O'Reilly publications, 2012.

Reference Books:

1. Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.

Web Resources:

1. https://github.com/adit0503/Reading_Books/blob/master/Devops/The%20DevOps%20Handbook%20-%20Gene%20Kim,%20Jez%20Humble,%20Patrick%20Debois,%20John%20Willis.pdf
2. <https://www.oreilly.com/library/view/building-a-devops/9781449368340/ch02.html#idm791344>
3. http://images.itrevolution.com/documents/DevOps_Handbook_Intro_Part1_Part2.pdf

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	1	-	-	3	2	-	-	-	1	-	-	2	2
CO2	-	-	1	2	-	3	-	-	-	-	1	-	1	1
CO3	1	2	-	-	3	-	-	-	-	-	-	1	2	2
CO4	-	1	2	-	-	-	3	-	-	-	-	-	1	1
CO5	-	3	1	-	2	-	--	-	-	-	-	1	1	2

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech I Semester			
Course Code 201HB591	QUANTITATIVE APTITUDE AND REASONING CSE, CSE(AI/ML), CSE(Cyber Security)				
Teaching	Total contact hours:32	L	T	P	C
Prerequisite(s): Mathematics		2	0	0	0

Course Objective(s):

1. Practice assigning variables to quantities to get desirable relationship between quantities.
2. Apply general mathematical models to solve a variety of problems.
3. Practicetothinklogicallyinordertodescriberelationshipinthegivendatatofinddesiredquantity.
4. Solveproblemsusingappropriatemethodsthroughlogicalrelationshipsandreasoning.
5. Improvetheir speedandaccuracyin solvingproblemsbyusingquicker methods.

Course Outcome(s):

On completion of the course, the students will be able to-

CO-1: Critically evaluate various real-life situations by resorting to analysis of key issues and factors.

CO-2: Represent mathematical information symbolically, visually, numerically, and verbally.

CO-3: Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

CO-4: Improvespeedandaccuracyin solvingproblemsbyusingquicker methods

CO-5: Identifyrecurringandmissingpatternsina sequence,whichinturnhelpsinenhancingdeductiveability.

UNIT-1:

Business Mathematics

Averages, Mixtures and Allegations: Definition of Average, Rules of Average, Problems on Average, Problems on Weighted Average, Finding average using assumed mean method, Problems on mixtures, Allegation rule, Problems on Allegation.

Ratio and Proportion: Definition of Ratio, Properties of Ratios, Comparison of Ratios, Problems on Ratios, Compound Ratio, Problems on Proportion, Mean proportional and Continued Proportion.

Variation: Direct variation, Inverse variation, Joint variation, Problems on Variations.

Percentages: Introduction, Converting a percentage into decimals, Converting a Decimal into a percentage, Percentage equivalent of fractions, Problems on percentages.

Profit and Loss: Problems on Profit and Loss percentage, Relation between Cost Price and Selling price, Discount and Marked Price, Two different articles sold at same Cost Price, Two different articles sold at same Selling Price, Gain% or Loss% on Selling Price.

Simple Interest: Definition and formula for amount in simple interest, Problems on interest and amount, Problems when rate of interest and time period are numerically equal,

Compound Interest: Definition and formula for amount in compound interest, Difference between simple interest and compound interest for 2 years on the same principle and time period.

UNIT-2:

Time Measurement

Time and Distance: Relation between speed, distance and time, Converting kmph into m/s and vice versa, Problems on average speed, relative speed, trains, boats and streams, circular tracks, races and games of skill.

Time and Work: Problems on Unitary method, Relation between Men, Days, Hours and Work, work and wages, Problems on Man-Day-Hours method, Problems on alternate days, Problems on Pipes and Cisterns.

UNIT-3:

Statistics & Geometry

Permutations and Combinations: Definition of permutation, Problems on Permutations, Definition of Combinations, Problems on Combinations.

Probability: Definition of Probability, Problems on coins, dice, deck of cards, years.

Data Interpretation: Problems on tabular form, Problems on Line Graphs, Bar Graphs, Pie Charts.

Data Sufficiency: Different models in Data Sufficiency, Problems on data redundancy.

Mensuration: Formulas for Areas, Formulas for Volumes of different solids, Problems on Areas, Problems on Volumes, Problems on Surface Areas.

UNIT-4:

Basic Reasoning& Logic

Number and Letter Series: Differenceseries, Productseries, Squaresseries, Cubesseries, Alternateseries, Combination series, miscellaneous series, Placevalues of letters.

Odd Man Out: Problems on numbers, Oddmanout, letterOddmanout, verbalOddmanout
Coding and Decoding: Coding using same set of letters, Coding using different set of letters, Coding into a number, Problems on R-model.

Direction Sense: Solving problems by drawing the paths, finding the net distance travelled, finding the direction, shadows, Problems on direction sense using symbols and notation.

Blood Relations: Defining the various relations among the members of a family, Solving Blood Relation puzzles, solving the problems on Blood Relations using symbols and notations.

Deductions: Finding the conclusions using Venn diagram method, finding conclusions using syllogism method

UNIT-5:

Advanced Reasoning

Analytical Reasoning Puzzles: Problems on Linear arrangement, problems on facing N-S and E-W directions, Circular arrangement, problems on towards the center and outwards, Double line-up, Problems on Selections, group reasoning and Comparisons.

TextBook:

1. Dr.R.S.Agarwal.AModernApproachto Quantitative Aptitude and LogicalReasoning.S.ChandPublishing.

Reference Books:

1. AbhijitGuha (2014). Quantitative Aptitude for Competitive Exams (5th Ed.). McGraw Hill Education.
2. Arun Sharma (2014). Quantitative Aptitude and Logical Reasoning for the CAT (6th Ed.). McGraw Hill Education.
3. R V Praveen (2016). Quantitative Aptitude and Reasoning (3rd Ed.). PHI Learning Private Limited.
4. Jaikishan.Premkishan.TestofReasoninginAllCompetitiveExams.ArihantPublications.

Web Resource:

1. <https://www.mygreatlearning.com/academy/learn-for-free/courses/crash-course-on-quantitative-aptitude-and-logical-reasoning>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
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Course Objective(s):

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech I Semester			
Course Code 201CS581	WEB APPLICATION DEVELOPMENT USING FULL STACK MODULE-3 CSE(AI/ML)				
Practical	Total contact hours:32	L	T	P	C
Prerequisite(s):Java Programming		0	0	3	1.5

To learn the basics of Web

Designing using HTML, DHTML, and CSS

To learn the basics about Client side scripts and Server side scripts

Course Outcome(s):

CO-1: By the end of the course, the student will be able to

CO-2: Describe basics of Web Designing using HTML, DHTML, and CSS

CO-3: Build real world applications using client side and server side scripting Design and develop applications using web serverslanguages

CO-4: Analyze the basics of PHP programming

CO-5: Apply Database connectivity with case study for student Information System and Health Management system

List of Experiments:

Experiment 1: Download and Install Node.js and NPM

Experiment 2: Write a Program to implement the Hello World Server with HTTP Node.js Module

Experiment 3: Write a program to create Calculator Node.js Module with functions adds, subtract & multiply and use the Calculator module in another Node.js file.

Experiment 4: Write a Node.js for File System to perform the following operations

- a) Create a File b) Read a File c) Write to a File d) Delete a File

Experiment 5: Create and manage an Employee Database Using Node.js MySQL

Experiment 6: Implement the following in Angular JS

- Angular Js data binding.
- Angular JS directives and Events.
- Using angular Js fetching data from MySQL.

Experiment 7: Write a program to implement AngularJS Scope

Experiment 8: Write a program to implement the following using Angular JS

- Input Validation
- Backend Building

Experiment 9: Write a program to include the framework's Stylesheet in the Angular CLI's Configuration

Experiment 10: Write a program to create an application for Students Record using AngularJS

Experiment 11: Create database, Create collection, insert data, find, find one, sort, limit, skip, distinct, projection

Experiment 12: Develop and demonstrate Invoking data using Mongo DB.

Experiment 13: Create an Online fee payment form using MangoDB

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	2	-	-	-	-	-	-	2	-	2	2
CO2	3	1	2	-	2		-	-	-	2	2	-	2	2
CO3	2	2	2	-		2	-	-	-		3	-	2	2
CO4	2	2	-	3	2		-	-	-	3		-	1	-
CO5	3	3	3	3	3	3	-	-	-	-	3	-	2	2

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech I Semester			
Course Code	NATURAL LANGUAGE PROCESSING LAB CSE (AI/ML)				
Practical	Total contact hours: 48	L	T	P	C
Prerequisite(s): ---		0	0	3	1.5

Course Objective(s)

- Understand the various concepts of natural language processing along with their implementation using Python

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-6:** Explore natural language processing (NLP) libraries in Python
- CO-7:** Learn various techniques for implementing NLP including parsing & text processing
- CO-8:** Apply support vector machine for text classification
- CO-9:** Understand how to use NLP for text feature engineering
- CO-10:** Develop applications related to NLP using Python

Python Libraries: NLTK, RE, Word2Vec

List of Experiments

1. Week 1 (Pre-processing text – 1)

- Convert text sentences into lower case, upper case, and sentence case.
- Demonstrate the use of various word tokenization processes such as WordPunctTokenizer, PunktWordTokenizer
- Demonstrate the use of various sentence tokenization processes such as sent_tokenize, RegexpTokenizer and PunktSentenceTokenizer on a set of sentences.
- Add other experiments from the NLTK book available online from <https://www.nltk.org/book/>

2. Week 2 (Pre-processing text – 2)

- Perform lemmatization and stemming using Python library NLTK.
- Remove stop words from a text corpora.
- Generate a parse trees for a set of a text corpora.
- Add other experiments from the NLTK book available online from <https://www.nltk.org/book/>

3. Week 3 (Pre-processing text – 3)

- Demonstrate noise removal for any textual data and remove regular expression pattern such as hash tag from a text corpora.
- Add other experiments from the NLTK book available online from <https://www.nltk.org/book/>

4. Week 4 (NER and standardization)

- Perform named entity recognition (NER) from a set of a text corpora
- Demonstrate object standardization such as replace social media slangs from a text corpora.

5. Week 5 (PoS Tagging and chunking)

- Perform part of speech tagging on a text corpora and generate corresponding parse trees.
- Carry out chunking and chunking of a text corpora

6. Week 6 (N-gram and measuring accuracy)

- a. Display the n-grams of a set of a text corpora.
- b. Display the accuracy, precision and recall of the text processing.
- 7. Week 7 (Regular expressions)**
 - a. Use regular expressions to parse an email address from a text corpora.
 - b. Remove numbers from a text corpora using regular expression.
 - c. Remove accent, punctuation marks and other diacritics from a text corpora.
- 8. Week 8 (LDA)**
 - a. Implement topic modeling using Latent Dirichlet Allocation (LDA).
- 9. Week 9 (TF-IDF and Cosine-similarity)**
 - a. Demonstrate Term Frequency- Inverse Document Frequency (TF - IDF).
 - b. Convert text to vectors (using term frequency) and apply cosine similarity to provide closeness among two texts.
- 10. Week 10 (Unicode, File operations, databases and connectivity)**
 - a. Read, process and create a text corpora of Unicode text (useful for processing Indian language sentences)
 - b. Read text from a text file, WhatsApp conversation or a Twitter blog
 - c. Plot graphs using Pylab
- 11. Week 11 (Word2Vec)**
 - a. Demonstrate word embeddings using Word2Vec.
- 12. Week 12 (Text classification)**
 - a. Implement text classification using Naïve Bayes classifier
 - b. Implement text classification using text blob library.
 - c. Apply support vector machine (SVM) for text classification.
- 13. Week 13 (Case study 1: Machine translation)**
 - a. Perform MT for converting a few text sentences from one language to another
- 14. Week 14 (Case study 1: Identify the sentiment of tweets)**
 - a. In this problem, you have tweet data to predict sentiment on electronic products of netizens.
- 15. Week 15 (Case study 2: Detect hate speech in tweets)**
 - a. The objective of this task is to detect hate speech in tweets. For the sake of simplicity, we say a tweet contains hate speech if it has a racist or sexist sentiment associated with it. So, the task is to classify racist or sexist tweets from other tweets.

Web References:

1. Steven Bird, Ewan Klein, and Edward Loper, “Natural Language Processing with Python – Analyzing Text with the Natural Language Toolkit”, available online at <https://www.nltk.org/book/>
4. <https://www.analyticsvidhya.com/blog/2017/01/ultimate-guide-to-understand-implement-natural-languageprocessing-codes-in-python/>
5. https://datahack.analyticsvidhya.com/contest/languipedia-codefest-natural-language-processing1/?utm_source=ultimate-guide-to-understand-implement-natural-language-processing-codes-inpython&utm_medium=blog
6. <https://www.analyticsvidhya.com/blog/2018/07/hands-on-sentiment-analysis-dataset-python/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	2	1	2	-	-	-	-	2	-	-
CO2	2	-	2	-	-	1	-	-	-	-	-	-
CO3	-	-	-	3	2	-	1	-	-	-	-	-

C04	1	2	-	-	3	1	-	-	-	1	-	-
C05	-	3	2	3	-	-	-	-	-	2	-	-

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech I Semester			
Course Code 201CS512	INTERNETWORKING PROTOCOL LAB CSE, CSE(AI/ML), CSE(Cyber Security)				
Practical	Total contact hours:48	L	T	P	C
Prerequisite(s): ---		0	0	3	1.5

Course Objective(s):

1. IP Addressing Internet Architecture IPv4 Addressing IP address Classes Subnets and subnet mask Subnets design with IP addressing.
2. To understand and implement the program leaky bucket algorithm.

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-1:** Identify the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
- CO-2:** Determine the basic concepts of application layer protocol design; including client/server models, peer to peer models, and network naming.
- CO-3:** In depth understanding of transport layer concepts and protocol design; including connection oriented and connection-less models, techniques to provide reliable data delivery and algorithms for congestion control and flow control.
- CO-4:** Analyze performance of various communication protocols.

Software Requirement:

- a) Turbo C/Borland C
- b) Install Wireshark in Ubuntu
(Download Wireshark here first: <https://kevincurran.org/com320/Wireshark-1.10.3.zip>)
- c) Install Samba and the graphical configuration tool
- d) Installation of Cisco Packet Tracer
- e) Socket Programming in C/C++

List of Programs:

1. Conversion of IP addresses (e.g. I/P: 10.24.164.254 O/P: 00001010.00011000.10000000.11111110 and I/P: binary dotted O/P: decimal dotted)
2. Configuration of IP address, Subnet Mask and Default Gateway.
3. Installation and introduction to Wireshark.
4. Wireshark Lab: Ethernet and ARP
5. To find out shortest path from source to destination using Dijkstras Algorithm.
6. To establish a straight over and cross over cable in LAN.
7. Implement for a leaky bucket algorithm congestion control.
8. Creating workgroup of computers and resource sharing (file & printer) (WindowsOS preferred)
9. Installation of Cisco Packet Tracer and demonstration of simple network topology using Cisco Packet Tracer.
10. Socket programming for TCP.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	2
CO2	2	-	2	2	-	-	-	-	-	-	-	-	2	2
CO3	3	3	-	-	-	-	-	-	-	-	-	-	2	2
CO4	2	-	1	-	2	2	-	-	-	3	-	-	2	2

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech II Semester			
Course Code 201AI601	ADVANCED DATA STRUCTURES CSE(AI/ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s):Programming Languages, Data Structures		3	0	0	3

Course Objective(s):

1. To analyze algorithms and to determine algorithm correctness and time efficiency class.
2. Master a variety of advanced abstract data type (ADT) and data structures and their implementations.
3. Master different algorithm design techniques
4. Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

Course Outcome(s):

After Completion of this course, a successful student will be able to-

CO-1: Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).

CO-2: Demonstrate the use of external memory and external search and sorting algorithms.

CO-3: Demonstrate the operations such as Insertion, Deletion and Search on Advanced Data structures like Heaps, AVL trees and B Trees.

CO-4: Analyze the space and time complexity of the algorithms studied the course.

CO-5: Comparisons of trees like Red Black trees and Splay Trees

UNIT-1

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

UNIT-2

AVL Trees: Maximum Height of AVL Tree, Insertions and Deletions. 2-3 Trees: Insertion, Deletion.

Binary Heaps: Creation Min and Max heap tree, Implementation of Insert and Delete into heap.

UNIT-3

Introduction of graphs: Representation of graphs by using linked list and adjacency matrix, graph operations and algorithms: insert an edge, delete an edge, insert a node, and delete a node. **Graph Traversal algorithms:** Breadth First Search and Depth First Search algorithm.

UNIT-4

Splay Trees: Simple idea, Splaying

Red Black Trees: Definition, Insertion and Deletion operations with examples.

UNIT-5

Pattern matching and Tries: Pattern matching algorithms- the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm

Tries: Definitions and concepts of digital search tree, Binary tree, Patricia, Multi-way tree.

Text Books:

1. Data Structures, A Pseudo code Approach, Richard F Gilberg, and Behrouz A Forouzan.

2. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson.
3. Fundamentals of Data Structures in C: 2nd ed, Horowitz, Sahani, Anderson-freed, Universities Press

Reference Books:

1. File Structures: An Object oriented approach with C++, 3rd ed, Michel J Folk, Greg Riccardi, Bill Zoellick
2. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu & EV Prasad, S Chand, 2010.

Web References:

<https://www.youtube.com/watch?v=zWg7U0OEAOE>
<https://www.digimat.in/nptel/courses/video/106106145/L01.html>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium];3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	1	-	-	1	2
CO2	2	-	3	-	-	-	-	3	-	3	-	-	1	3
CO3	1	2	3		3		-	-	-	2	-	-	2	3
CO4	-	-	-	2	3	1	-	3	-	2	-	-	2	2
CO5	2	-	-	-	-	-	-	2	-	2	-	-	1	2

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech II Semester			
Course Code 201AI664A	BIG DATA ANALYTICS CSE(AI/ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s): Mathematics, SQL, R, Python, and other programming language		3	0	0	3

Course Objective(s):

1. To optimize business decisions and create competitive advantage with Big Data analytics
2. To acquire knowledge how to use intelligent techniques to analyse big data
3. To instigate programming tools PIG & HIVE in Hadoop ecosystem

Course Outcome(s):

On completion of the course, the students will be able to-

CO-1: Illustrate big data challenges in different domains including social media, transportation, finance and medicine

CO-2: Utilize various techniques for mining data stream

CO-3: Design and develop Hadoop

CO-4: Identify the characteristics of datasets and compare the trivial data and big data for various applications

CO-5: Explore the various search methods and visualization techniques

UNIT-I

Introduction to Big Data-Fundamentals of Big-data, Big Data-definition, Why Big data, What comes under Big Data?, Operational Big Data, Analytical Big Data, Characteristics of Big Data (Volume, Variety, Velocity and other V's), Importance of Big Data, Types of Big Data (Structured data, Semi-structured data, Unstructured data), The sources of Big Data, Benefits of Big Data, Big data applications, Challenges of Big Data.

UNIT-II

Introduction to Hadoop- Google File System, Hadoop Distributed File System (HDFS), what is Hadoop, Why Hadoop, Why is Hadoop important?, Scale-out Storage, Difference Comparing SQL databases(RDBMS) and Hadoop, Hadoop Architecture, Hadoop ecosystem components, Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, Tasktracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files. Common Hadoop Shell commands.

Spark- Introduction to Spark, Features of Spark, Components of Spark, Resilient distributed datasets.

UNIT-III

Introduction to MapReduce- Introduction to MapReduce, MapReduce Definitions, Benefits of MapReduce, MapReduce Algorithm, Map Reduce Workflow (Mapper-Partitioner-Combiner-Shuffle-Sort-Reducer-Output), Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of HadoopMapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner.

UNIT-IV

Pig: Hadoop Programming Made Easier- Introduction to PIG, Configuring PIG, Admiring the Pig Architecture, Introduction to grunt shell, going with the Pig Latin Application Flow, Uncovering Pig Latin structures, looking at Pig data types and syntax, Evaluating Local and Distributed Modes of Running Pig scripts, checking out the Pig Script Interfaces.

UNIT-V

Applying Structure to Hadoop Data with Hive- Introduction to HIVE, Configuring Hive, HIVE Architecture, Comparison with Traditional Databases, HIVE data Types (Primitive types, Conversions, Complex types), Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Text Books

1. Big Data”, Black Book DT Editorial Services, Wiley publications.
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O’reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss

Reference Books

1. Big Data Black Book, DreamTech
2. Chris Eaton, Dirk deRoos et al., “Understanding Big Data”, McGraw Hill, 2012.
3. Hadoop in Practice by Alex Holmes, MANNING Publ.
4. HadoopMapReduceCookbook, Srinath Perera, Thilina Gunarathne
5. Mining of massive datasets, Anand Rajaraman, Jeffrey D Ullman, Wiley Publications.

Web Resources:

1. <http://www.bigdatauniversity.com>
2. <http://hadoop.apache.org/>
3. <https://pig.apache.org/docs/latest/start.html>
4. <https://cwiki.apache.org/confluence/display/PIG/Index>
5. <https://pig.apache.org/>
6. <https://cwiki.apache.org/confluence/display/Hive/Home>
7. <https://hive.apache.org/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	2	-	2	2	-	1	2	-	-	1	1
CO2	2	2	-	-	-	3	1	-	2	1	-	-	2	-
CO3	3	1	3	-	-	2	2	-	3	2	-	-	1	-
CO4	3	2	-	-	-	2	-	-	2	-	-	-	2	2
CO5	2	-	-	-	-	1	-	-	1	-	-	-	1	1

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY(Autonomous)	III B.Tech II Semester			
CourseCode 201AI602	SOFT COMPUTING CSE(AI/ML)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Programming, Linear Algebra and Probability		3	0	0	3

Course Objective(s):

1. To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for real-world problems.
2. To provide adequate knowledge of non-traditional technologies and fundamentals of artificial neural networks, back propagation networks, fuzzy sets, fuzzy logic, genetic algorithms in solving social and engineering problems.
3. To provide comprehensive knowledge of associative memory networks and adaptive resonance theory.

Course Outcome(s):

After completion of the course the student will be able to-

CO-1: Apply neural networks, for solving different engineering problems.

CO-2: Identify and describe soft computing techniques and build supervised learning and unsupervised learning networks.

CO-3: Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.

CO-4: Apply genetic algorithms to combinatorial optimization problems

UNIT-1

Introduction to Soft computing: Soft computing vs. hard computing, evolution of soft computing, features and, applications of soft computing, Basic concepts of Neural Networks

UNIT-2

Neural Networks: Basic concepts of Neural Networks, Model of Artificial Neuron, Neural Network Architectures, Feed forward neural network, Back propagation network (BPN) Radial Basis function network, Supervised, Unsupervised, and Reinforcement Learning, Back propagation Learning.

UNIT-3

Fuzzy Sets: Fuzzy versus Crisp, Crisp Sets, Fuzzy sets, Membership functions, fuzzy set operations, properties of Fuzzy sets, Crisp Relations, Fuzzy relations

Fuzzy Logic and Inference: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Quantifiers, Fuzzy Inference, Fuzzy knowledge and rule-based system, fuzzy decision making, Defuzzification.

UNIT-4

Genetic Algorithms: Introduction to Genetic Algorithm, working principles, encoding, fitness function, reproduction.

Genetic modelling: Inheritance operator, crossover, mutation operator, Generational Cycle, Convergence of GA.

UNIT-5:

Recent Trends in deep learning, various classifiers, neural networks and genetic algorithm Implementation of recently proposed soft computing techniques.

Text Books

1. S. Rajasekaran& G.A. VijayalakshmiPai, “Neural Networks, Fuzzy systems and evolutionary algorithms: Synthesis and Applications”, PHI Publication, 2 ndEd. 2017.
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, John Wiley and Sons, 3 rded, 2011.
3. S.N. Sivanandam& S.N. Deepa, “Principles of Soft Computing”, Wiley Publications, 3rded, 2018..

Reference Books

1. Jang, Jyh-Shing Roger, Chuen-Tsai Sun, and EijiMizutani. "Neuro-fuzzy and soft computing a computational approach to learning and machine intelligence" Pearson, 1997.
2. Kosko, B., Neural Networks and Fuzzy Systems: A Dynamical Systems Approach to Machine Intelligence, PHI Publication, 1994.
3. George J. Klir,Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, 2015
4. Rich E andKnight K, Artificial Intelligence, McGraw Hill Education; 3 rded, 2017.
5. S. Haykin, “Neural Networks and Learning Machines”, Pearson Education Inc., 3rd Ed 2008.

Web Resources:

1. https://www.youtube.com/watch?v=K9gjuXjJeEM&list=PLJ5C_6qdAvBFqAYS0P9INAogIMklG8E-9
2. https://www.youtube.com/watch?v=-U-QCX2C8T8&list=PLJ5C_6qdAvBFqAYS0P9INAogIMklG8E-9&index=2

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	3	1	-	-	1	-	2	-	3	-	2	3
CO2	3	2	3	1	-	-	2	-	2	3	2	2	1	3
CO3	1	1	-	3	2	1	2	1	1	2	-	-	1	1
CO4	3	1	2	2	-	-	-	1	-	-	2	2	1	-
CO5	1	2	3	1	-	2	-	-	-	1	-	-	2	1

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech II Semester			
Course Code 201AI603	MACHINE LEARNING CSE,CSE(AI/ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s): Data structures , regression methods and reduction techniques		3	0	0	3

Course Objective(s):

1. To comprehend about basic concepts of Machine Learning.
2. To instigate fundamentals of data analytics using Python
3. To solicit the appropriate machine learning strategy for any given problem.
4. To develop skills of using recent machine learning software for solving practical problems.

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-1:** Explore the concepts related to Machine Learning techniques.
- CO-2:** Demonstrate Pre-processing techniques and perform exploratory data analysis related to a scenario.
- CO-3:** Identify and apply the appropriate techniques to process the data and solve the applications using machine learning techniques
- CO-4:** Apply data analytics principles and techniques of Machine learning to solve real time problems
- CO-5:** Design application using machine learning techniques

UNIT-1

Introduction to Machine learning: Introduction to Machine Learning, types of Machine learning, Applications, Machine Learning Process, Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning

UNIT-2

Python for Machine Learning: Introduction to Pandas Data structures, Function Application & Mapping, Correlation & Covariance, Handling Missing Data, Reading & Writing Data in CSV or text files, Data Preparation-Merging and Removing data, Data Transformation-Removing Duplicates, Mapping

UNIT-3

Concept Learning & Unsupervised Learning: Introduction to Bayes Theorem and Concept learning, Naive Bayes Classifier, Applications of Naïve Bayes Classifier, Clustering –Different types of the clustering techniques, K-Means Clustering

UNIT-4

Supervised Learning: Training a model-Linear Regression, Multiple Linear regression, Improving accuracy of Linear Regression Model, Polynomial Regression Model Classification-Introduction, Decision Tree, Random Forest Model, Support Vector Machines, Boosting

UNIT-5

Neural Network and Deep Learning

Artificial Neural Networks: Introduction Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Back propagation algorithm.

Deep Learning-Introduction, Deep Learning Architectures.

Text Books

1. Machine Learning ,Tom M. Mitchell, MGH
2. Machine Learning with Python: Design and Develop Machine Learning and Deep Learning, BPB Publishing, India, 2018
3. Fabio Nelli, "Python Data Analytics", Apress, Springer Science + Business Media Finance Inc (SSBM Finance Inc).

Reference Books

1. Jake Vander plas, "Python Data Science Handbook: Essential tools for working with data", O'Reilly Publishers, I Edition.
2. EthemAlpaydin "Introduction to Machine Learning" 2nd Edition PHI Learning Pvt. Ltd-New Delhi.

Web Resources:

1. <https://nptel.ac.in/courses/106106139>
2. <https://www.deeplearning.ai/machine-learning-yearning/>
3. <https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html>

CO-PO Mapping:

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	2	2	-	2	2	-	-	2	-	2	1
CO2	2	2	3	1	2	-	1	1	-	-	1	-	1	-
CO3	1	2	1	2	1	-	2	2	-	-	2	-	2	-
CO4	2	1	-	3	2	-	-	-	-	-	2	-	-	1
CO5	3	2	-	-	2	1	-	-	-	-	1	-	-	1

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech II Semester			
Course Code 201AI664A	MEAN STACK TECHNOLOGIES CSE(AI/ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s):Java Programming, Database Management Systems		3	0	0	3

Course Objective(s):

1. Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client.
2. Writing optimized front end code HTML and JavaScript.
3. Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution
4. Design and implementation of Robust and Scalable Front End Applications.

Course Outcome(s):

After Completion of this course, a successful student will be able to-

CO-1: Identify the basic concepts of Web & Markup Languages.

CO-2: Develop web Applications using Scripting Languages & Frameworks.

CO-3: Make use of Express JS and Node JS frameworks

CO-4: Illustrate the uses of web services concepts like restful, react js.

CO-5: Adapt to Deployment Techniques & Working with cloud platform.

UNIT-1

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-2

JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions.

Angular Java Script-AngularJS Expressions: ARRAY, Objects, \$eval, Strings, AngularJS Form Validation & Form Submission.

UNIT-3

Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules.

Express.js: Introduction to Express Framework, 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

UNIT-4

RESTful Web Services: Using the Uniform Interface, Designing URIs, Web Linking, Conditional Requests.

React Js: Welcome to React, 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.

UNIT-5

MongoDB:Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

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, SubbuAllamraju, O'Reilly
5. JavaScript & jQuery the missing manual, David Sawyer McFarland, O'Reilly
6. Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Web Resources:

1. <https://nptel.ac.in/courses/106106156>
2. https://onlinecourses.nptel.ac.in/noc20_cs52/preview
3. <https://www.youtube.com/watch?v=E-GA9GKJWuE>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium];3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	2	-	1	-	1	-	-	-	-	1	2
CO2	3	1	1	2	-	2	-	2	-	-	-	-	-	2
CO3	2	2	2	1	-	1	-	1	-	-	-	-	1	2
CO4	1	2	1	2	-	2	-	1	-	-	-	-	-	2
CO5	3	2	3	1	-	2	-	1	-	-	-	-	1	2

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech II Semester			
Course Code 201MB691	IPR AND PATENTS CSE, CSE (AI/ML), CSE (Cyber Security)				
Teaching	Total contact hours: 32	L	T	P	C
Prerequisite(s): ---		2	0	0	0

Course Objective(s):

1. To realize the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines
2. Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments

Course Outcome(s):

After Completion of this course, a successful student will be able to-

CO-1: Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents

CO-2: Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements

CO-3: Enhance technical skills to get patents and understand copyright laws.

CO-4: Analyze the Laws relating to the Trade Marks.

CO-5: Explore the Trade Secrets & Cyber Law and Cyber Crime.

UNIT-1

Introduction to Intellectual Property Rights (IPR): 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 Neighbouring 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-2

Copyrights and Neighbouring 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-3

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-4

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-5

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.

Textbooks:

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).
6. Cyber Law – Texts & Cases, South-Western's Special Topics Collections.
7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

Web References:

https://onlinecourses.nptel.ac.in/noc22_hs59/preview

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	-	1	-	-	-	2	3	2	-	1	-	-	1	2
CO2	-	-	-	2	-	3	3	3	-	-	-	1	1	3
CO3	1	-	2	-	-	2	3	3	-	-	-	-	1	2
CO4	1	-	3	2	-	2	-	-	-	-	-	-	2	3
CO5	2	-	3	2	-	3	-	-	-	-	-	-	2	3

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech II Semester			
Course Code 201HB681	ENGLISH FOR CAREER CSE (AI/ML)				
Teaching	Total contact hours: 32	L	T	P	C
Prerequisite(s): Communicative English		0	1	2	2

Course Objective(s):

1. To achieve proficiency in formal English usage
2. To enhance both written and spoken communication in connection with professional needs
3. To constitute them industry ready in terms of grooming, speaking in in-formal occasions

Course Outcome(s):

After Completion of this course, a successful student will be able to-

CO-16: Comprehend the necessity to improve four language skills

CO-17: Acquire knowledge about public speaking ability

CO-18: Strengthen their grammatical skills in the language

CO-19: Enhance necessary vocabulary and academic writing skills

CO-20: Enhance academic writing skills

UNIT-1

Technical Communication: Report writing: Importance, structure, drafting of reports, Types of reports-formal-informal reports-Business Writing: Sales letters, notices, agenda and minutes of the meeting-Information Transfer

UNIT-2

Communication Practice -Debating and Role Playing-Meaning-Do's and don'ts-Voice modulation-fluency-Keep it short and sweet-formal discussions-summarizing techniques- Group discussion-do's and don'ts -JAM sessions

UNIT-3

Grammar In Use-Tense and aspect-Verb patterns-usage of progressive tense- Types and kinds of sentences -Question tags-Usage of Auxiliaries- Common errors

UNIT-4

Vocabulary Building-Affixes- synonyms and antonyms- Phrasal verbs- Homonyms-Eponyms-Idioms- verbal Analogies- one word substitutes- Collocations

UNIT-5

(a) **Occupational competency**- Interview skills- self introduction-performance management planning-strategic planning-Negotiation techniques-visual communication- - delegation-filling personal information-C.V.preparation-Mock Interviews

(b) **LSRW Skills**-Selected lessons from UNLOCK-2 published by Cambridge University Press, mobile etiquette, table manners, dressing style

Text Books:

1. UNLOCK SERIES from Cambridge University Press

Reference Book:

1. Reading and Writing Listening and Speaking

Web Resources:

1. <https://www.englishclub.com/>
2. <http://www.world-english.org/>
3. <http://learnenglish.britishcouncil.org/>

CO-PO Mapping:

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	2	2	2	3	2	-	2	2	-	1	2
CO2	2	2	2	2	1	3	3	3	-	1	1	1	2	2
CO3	1	1	2	3	1	-	-	3	-	1	2	-	1	1
CO4	1	2	3	3	3	3	3	3	-	2	3	1	1	2
CO5	2	3	2	2	2	2	2	2	-	-	-	-	2	3

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech II Semester			
Course Code 201AI611	ADVANCED DATA STRUCTURES LAB CSE (AI/ML)				
Practical	Total contact hours: 48	L	T	P	C
Prerequisite(s): Data Structures		0	0	3	1.5

Course Objective(s):

- To impart adequate knowledge on Data Structures
- To develop the skills of programming for implementing Data Structures.
- To implement various algorithms using a programming language.

Course Outcome(s):

After Completion of this course, a successful student will be able to-

- CO-1:** Master a variety of advanced abstract data type (ADT) and data structures and their implementations.
- CO-2:** Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc)
- CO-3:** Ability to apply and implement learned algorithm design techniques and data Structures to solve problems.

List of Experiments:

1. Implement functions of Dictionary using Hashing (division method, Multiplication method, Universal hashing)
2. Perform various operations i.e., insertions and deletions on AVL trees
3. Perform various operations i.e., insertions and deletions on 2-3 trees.
4. Implement operations on binary heap.
5. Implement operations on graphs
 - a) Vertex insertion
 - b) Vertex deletion
 - c) Finding vertex
 - d) Edge addition and deletion
6. Implement Depth First Search for a graph non recursively.
7. Implement Breadth First Search for a graph non recursively.
8. Implement Prim's algorithm to generate a min-cost spanning tree.
9. Implement Krushkal's algorithm to generate a min-cost spanning tree.
10. Implement Dijkstra's algorithm to find shortest path in the graph.
11. Implement pattern matching using Boyer-Moore algorithm.
12. Implement Knuth-Morris-Pratt algorithm for pattern matching.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1	1	-	2	1	2	-	-	-	-	2	-	-	1	1
CO 2	2	-	2	-	-	1	-	-	-	-	-	-	2	2
CO 3	-	-	-	3	2	-	1	-	-	-	-	-	1	2
CO 4	1	2	-	-	3	1	-	-	-	1	-	-	1	2
CO	-	3	2	3	-	-	-	-	-	2	-	-	2	1

[illegible]

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech II Semester			
Course Code 201AI612	SOFT COMPUTING LAB CSE (AI/ML)				
Practical	Total contact hours: 48	L	T	P	C
Prerequisite(s):---		0	0	3	1.5

Course Objective(s)

1. To describe supervised and un-supervised learning differences
2. To describe the data science life cycle.
3. To use machine take data science into production.
4. To introducing data science, with a focus on the job outlook and market requirements.
5. To gain knowledge relate to Hands-on Applied Statistics concepts using python
6. To use Graphics and data visulization libraries in python
7. To know Machine learning algorithms, Models and case studies with python

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-1:** Use deep learning techniques to build concise representations of the meanings of words in all significant languages.
- CO-2:** Use machine learning methods to solve the real – world problems.
- CO-3:** Develop a feed forward, convolution and recurrent neural networks.
- CO-4:** Experiment with AI and data visualization techniques.
- CO-5:** Examine map reduce,Naïve Byes and K-Means clustering

List of Experiments

1. To solve the real-world problems using the following machine learning methods :
 - a) Linear regression
 - b) Logistic regression
2. Implement support vector machine
3. Implement K-Means clustering & PCA
4. Implementation of map reduce
5. Implementation of Naïve Bayes
6. Exploratory Data Analysis for Classification using Pandas and Matplotlib
7. Implement a program for Bias, Variance, and Cross Validation
8. Implementation of Feed Forward Neural Networks
9. Implementation of ConvolutionNeural Networks
10. Implementation of Recurrent Neural Networks
11. Write a program to simulate a perception network for pattern classification and function approximation.
12. Solve optimal relay coordination as a Linear programming problem using Genetic algorithm
13. Solve optimal relay coordination as a non-Linear programming problem using Genetic algorithm

14. Solve economic load dispatch problem using Genetic algorithm

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1	1	-	2	1	2	-	-	-	-	2	-	-	2	1
CO 2	2	-	2	-	-	1	-	-	-	-	-	-	1	2
CO 3	-	-	-	3	2	-	1	-	-	-	-	-	2	2
CO 4	1	2	-	-	3	1	-	-	-	1	-	-	1	1
CO 5	-	3	2	3	-	-	-	-	-	2	-	-	1	2

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IV B.Tech I Semester			
Course Code	DISTRIBUTED SYSTEMS CSE(AI &ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s): Operating Systems		3	0	0	3

Course Objective(s):

1. To demonstrate an understanding of the fundamental concepts of distributed systems and their characteristics, system models and architectural models for distributed systems.
2. To teach interprocess communication techniques, including sockets, UDP and TCP communication, and external data representation.
3. To provide an understanding of distributed objects and remote invocation, including design issues, implementation, and distributed garbage collection.
4. To teach about operating system support for distributed systems, including processes, threads, and protection.
5. To introduce distributed file systems, including file service architecture and peer-to-peer systems.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Recall the characteristics of distributed systems and the challenges they face.

CO-2: Design distributed architectures using appropriate system models and architectural models.

CO-3: Create an interprocess communication using sockets, UDP and TCP communication, and external data representation.

CO-4: Design and implement distributed objects and remote invocation using RMI.

UNIT-I

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT-II

Interprocess Communication: Introduction, The API for the Internet Protocols- the Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

UNIT-III

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Model, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

UNIT-IV

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads–Address Space, Creation of a New Process, Threads.

UNIT-V

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

TEXT BOOKS

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication
2. "Distributed Computing: Principles, Algorithms, and Systems" by Ajay D. Kshemkalyani and MukeshSinghal, Cambridge University Press.

REFERENCE BOOKS

1. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.
3. Understanding Distributed Systems By Roberto Vitillo · 2021

REFERENCE LINKS

1. https://onlinecourses.nptel.ac.in/noc21_cs87/preview
2. https://www.google.co.in/books/edition/Guide_to_High_Performance_Distributed_Co/wWCYBgAAQBAJ?hl=en&gbpv=1&dq=1.+George+Coulouris,+Jean+Dollimore,+Tim+Kindberg,+%E2%80%9CDistributed+Systems-+Concepts+and+Design%E2%80%9D,+Fourth+Edition,+Pearson+Publication&pg=PA30&printsec=frontcover

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

[illegible]

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech (1 semester)			
Course Code	CLOUD COMPUTING CSE(AI&ML)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Operating Systems, Database Management Systems and Networking Fundamentals		3	0	0	3

Course Objective (s):

1. To introduce the concepts of distributed computing, cloud computing, and virtualization.
2. To familiarize students with system models and software environments for distributed systems and clouds.
3. To provide an understanding of virtualization of clusters, data centers, and resource management.
4. To introduce cloud platform architecture and design of compute and storage clouds.
5. To provide knowledge of programming paradigms and software environments for cloud platforms.
6. To introduce storage systems and distributed file systems.

Course Outcome(s):

On completion of the course, the students will be able to-

- CO-1: Realize the concepts of distributed computing, cloud computing, and virtualization.
- CO-2: Create system models and software environments for distributed systems and clouds.
- CO-3: Design cloud platform architecture and compute and storage clouds.
- CO-4: Develop programming paradigms and software environments for cloud platforms.
- CO-5: Analyze and implement storage systems and distributed file systems.

Unit-I

Systems modeling, Clustering and virtualization: Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.

Unit-II

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

Unit-III

Cloud Platform Architecture: Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

Unit-IV

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Unit-V

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system, Apache Hadoop, Big Table, Megastore, and Amazon Simple Storage Service (S3).

Text Books

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IV B.Tech I Semester			
Course Code	SPEECH PROCESSING CSE(AI &ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s): Speech Fundamentals		3	0	0	3

Course Objective(s):

1. To provide a comprehensive understanding of the basic concepts of speech signal processing, speech analysis, and speech modeling.
2. To introduce the techniques for feature extraction and pattern comparison, as well as speech distortion measures and their evaluation.
3. To explain the concepts of hidden Markov models and their implementation issues in speech modeling.
4. To provide a detailed overview of large vocabulary continuous speech recognition systems and their architecture.
5. To introduce the principles and methods of text-to-speech synthesis, including concatenative and waveform synthesis methods, subword units, and the role of prosody.

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-1: Comprehend the production and classification of speech sounds and the acoustics of speech production.
- CO-2: Examine speech signals and extract features using various techniques such as LPC, PLP, and MFCC coefficients.
- CO-3: Model speech signals using hidden Markov models and evaluate their performance using evaluation metrics.
- CO-4: Design and implement large vocabulary continuous speech recognition systems.
- CO-5: Realize the principles and methods of text-to-speech synthesis and implement concatenative and waveform synthesis methods for subword units.

Unit-I

Basic Concepts: Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.

Unit-II

Speech Analysis: Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping

Unit-III

Speech Modelling: Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, Implementation issues.

Unit-IV

Speech Recognition: Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – ngrams, context dependent sub-word units; Applications and present status

Unit-V

Speech Synthesis: Text-to-Speech Synthesis: Concatenative and waveform synthesis methods,

subword units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

Text Books

1. Fundamentals of Speech recognition – L. Rabiner and B. Juang, Prentice Hall signal processing series.
2. Lawrence Rabiner and Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson Education, 2003.
3. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education.

Reference Books:

1. Steven W. Smith, “The Scientist and Engineer’s Guide to Digital Signal Processing”, California Technical Publishing.
2. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education.
3. Claudio Becchetti and LucioPrinaRicotti, “Speech Recognition”, John Wiley and Sons, 1999.
4. Ben gold and Nelson Morgan, “Speech and audio signal processing”, processing and perception of speech and music, Wiley- India Edition, 2006 Edition.
5. Frederick Jelinek, “Statistical Methods of Speech Recognition”, MIT Press.

Web Resources:

1. <https://nptel.ac.in/courses/117105145>
2. <http://mu.ac.in/wp-content/uploads/2014/04/SPEECH-RECOGNITION.pdf>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	2	2	-	2	2	-	-	2	-	2	1
CO2	2	2	3	1	2	-	1	1	-	-	1	-	1	-
CO3	1	2	1	2	1	-	2	2	-	-	2	-	2	-
CO4	2	1	-	3	2	-	-	-	-	-	2	-	-	1
CO5	3	2	-	-	2	1	-	-	-	-	1	-	-	1

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IVB.Tech I Semester			
Course Code	DEEP LEARNING CSE(AI&ML)				
Teaching	Total contact hours: 48	L	T	P	C
Prerequisite(s): An introductory course in Machine Learning		3	0	0	3

Course Objective(s):

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To learn various types of Artificial Neural Networks
4. To gain knowledge to apply optimization strategies

Course Outcome(s):

On completion of the course, the students will be able to-

CO1: Summarize the concepts of Neural Networks

CO2: Discover the Learning Networks in modelling real world systems

CO3: Ability to use an efficient algorithm for Deep Models

CO4: Ability to apply optimization strategies for large scale applications

Unit-I

Introduction: Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks Training Algorithms for pattern association, BAM and Hopfield Networks.

Unit-II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks, Special Networks-Introduction to various networks.

Unit-III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s): Basics of Programming Language		3	0	0	3

Course Objective(s):

1. To introduce students to the concept of Robotic Process Automation (RPA) and its use cases.
2. To provide an understanding of Automation Anywhere Enterprise Platform and its advanced features and capabilities.
3. To teach ways of creating bots using various recorders and commands.
4. To introduce the Web Control Room and Client features, including Activity, Devices, Workload, Audit Log, and Administration.
5. To demonstrate the use of APIs in RPA and client introduction.
6. To teach how to manage errors and control workflow using error handling and workflow designer.

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-1: Comprehend RPA and its applications in various industries.
- CO-2: Create bots for automating various tasks. Describe how to handle the User Events and various types of Exceptions and strategies.
- CO-3: Familiar with various recorders and commands for creating bots.
- CO-4: Navigate through the Web Control Room and use its features.
- CO-5: Use APIs for RPA and manage errors and workflow using error handling and workflow designer.

UNIT-I

Introduction to Robotic Process Automation: Scope and techniques of automation, Robotic process automation - What can RPA do?, Benefits of RPA, Components of RPA, RPA platforms, The future of automation. RPA BASICS: History of Automation - What is RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Development methodologies - Difference from SDLC - Robotic control flow architecture - RPA business case - RPA Team - Process Design Document/Solution Design Document - Industries best suited for RPA - Risks & Challenges with RPA - RPA and emerging ecosystem.

UNIT-II

RPA tool introduction and basics: Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces- Control Flow - Control Flow Introduction - If Else Statements - Loops - Advanced Control Flow - Sequences - Flowcharts - About Control Flow - Control Flow Activities - The Assign Activity - The Delay Activity - The Do While Activity - The If Activity - The Switch Activity - The While Activity - The For Each Activity - The Break Activity - Data Manipulation - Data Manipulation Introduction - Scalar variables, collections and Tables - Text Manipulation - Data Manipulation - Gathering and Assembling Data

UNIT-III

Advanced automation concepts & techniques: Recording Introduction - Basic and Desktop Recording - Web Recording - Input/output Methods - Screen Scraping - Data Scraping - Scraping advanced techniques - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation - Image based automation - Keyboard based automation - Information Retrieval - Advanced Citrix Automation challenges - Best Practices - Using tab for Images - Starting Apps - Excel Data Tables & PDF - Data Tables in RPA - Excel and

Data Table basics - Data Manipulation in excel – Extracting Data from PDF - Extracting a single piece of data - Anchors - Using anchors in PDF.

UNIT-IV

Handling user events & assistant bots, exception handling: What are assistant bots? - Monitoring system event triggers - Hotkey trigger - Mouse trigger - System trigger - Monitoring image and element triggers - An example of monitoring email - Example of monitoring a copying event and blocking it - Launching an assistant bot on a keyboard event.

Exception handling: Debugging and Exception Handling - Debugging Tools - Strategies for solving issues - Catching errors.

UNIT-V

Deploying and maintaining the bot: Publishing using publish utility - Creation of Server - Using Server to control the bots - Creating a provision Robot from the Server - Connecting a Robot to Server - Deploy the Robot to Server - Publishing and managing updates - Managing packages - Uploading packages - Deleting packages

Text Book

1. Alok Mani Tripathi, "Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath" Packt Publishing, 2017.

Reference Books

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.
2. Frank Casale , Rebecca Dilla, Heidi Jaynes , Lauren Livingston, "Introduction to Robotic Process Automation: a Primer", Institute of Robotic Process Automation, 1st Edition 2015.
3. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant", Independently Published, 1st Edition 2018.
4. Srikanth Merianda, "Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation", Consulting Opportunity Holdings LLC, 1st Edition 2018.
5. Lim Mei Ying, "Robotic Process Automation with Blue Prism Quick Start Guide: Create software robots and automate business processes", Packt Publishing, 1st Edition 2018.

Web Resources:

1. <https://nptel.ac.in/courses/112101099>
2. <https://www.uipath.com/rpa/robotic-process-automation>
3. <https://www.academy.uipath.com>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	2	2	-	2	-	-	-	2	-	2	1
CO2	2	2	3	1	2	-	1	-	-	-	1	-	1	-
CO3	1	2	1	2	1	-	2	-	-	-	2	-	2	-
CO4	2	1	-	3	2	-	-	-	-	-	2	-	-	1
CO5	3	2	-	-	2	1	-	-	-	-	1	-	-	1

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IV B.Tech I Semester			
Course Code	INFORMATION STORAGE AND MANAGEMENT CSE(AI&ML)				
Teaching	Total contact hours: 48	L	T	P	C
Prerequisite(s): Computer Architecture, Operating Systems, Networking, and databases		3	0	0	3

Course Objective(s):

1. To understand the basic components of Storage System Environment.
2. To understand the Storage Area Network Characteristics and Components.
3. To examine emerging technologies including IP-SAN.
4. To describe the different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities.
5. To understand the local and remote replication technologies.

Course Outcome(s):

On completion of the course, the students will be able to-

- CO-1:** Identify the logical and physical components of a storage infrastructure.
- CO-2:** Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
- CO-3:** Analyzing the various forms and types of Storage Virtualization.
- CO-4:** Describe the different role in providing disaster recovery and business continuity capabilities.
- CO-5:** Distinguish different remote replication technologies.

Unit-I

Introduction to Storage Technology: Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization.

Unit-II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

Unit-III

Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison. Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

Unit –IV

Hybrid Storage solutions: Virtualization: Memory, network, server, storage & appliances. Data center concepts & requirements, Backup & Disaster Recovery: Principles Managing & Monitoring: Industry management standards (SNMP, SMI-S, CIM), standard framework applications, Key management metrics (Thresholds, availability, capacity, security, performance).

Unit V

Storage Security and Management: Security Framework, Storage security domains, List and analyzes the common threats in each domain, Security Implementations. Managing The Storage Infrastructure: Monitoring the Storage Infrastructure, Storage Management Activities, Challenges and solutions.

Text Books

1. G. Somasundaram & Alok Shrivastava (EMC Education Services) editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network explained: Basic and application of fiber channels, SAN, NAS, iSES, INFINIBAND and FCOE, Wiley India.

Reference Books

1. John W. Rittinghouse and James F. Ransome; Cloud Computing: Implementation, Management and Security, CRC Press, Taylor Frances Pub.
2. Nick Antonopoulos, Lee Gillam; Cloud Computing: Principles, System & Application, Springer.
3. Anthony T. Velete, Toby J. Velk, and Robert Eltenpeter, Cloud Computing: A practical Approach, TMH Pub. 6. Saurabh , Cloud Computing : Insight into New Era

Web Resources:

1. <http://aad.tpu.ru/practice/EMC/Information%20Storage%20and%20Management-v.2.pdf>
2. <http://rsmt.it.fmi.uni-sofia.bg/HPstorage/Storage%20Networks%20Explained%202nd%20Edition.pdf>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]; '-' : No Correlation)

[illegible]

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IV B.Tech I Semester			
Course Code	DATA MINING AND KNOWLEDGE DISCOVERY CSE(AI &ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s): Basic knowledge in database systems		3	0	0	3

Course Objective(s):

1. To gather and analyze large sets of data to gain useful business understanding.
2. To produce a quantitative analysis report/memo with the necessary information to make decisions.
3. To demonstrate basic data mining algorithms, methods, and tools
4. To identify business applications of data mining

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-1: Analyze what is Data Mining, kinds of data can be mined, patterns can be mined, and applications are targeted.
- CO-2: Apply machine learning, pattern recognition, statistics, visualization, algorithm, database technology and high-performance computing in data mining applications.
- CO-3: Identify what kinds of technologies are used for different application.
- CO-4: Manipulate data preprocessing, data Warehouse and OLAP technology, data cube technology; mining frequent patterns and association, classification, clustering, and outlier detection.

Unit I

Introduction to Knowledge Discovery and Data Mining - reprocessing Methods: Data Cleansing: A Prelude to Knowledge Discovery, Handling Missing Attribute Values, Geometric Methods for Feature Extraction and Dimensional Reduction, Dimension Reduction and Feature Selection, Discretization Methods, Outlier Detection,

Unit II

Supporting Methods- Statistical Methods for Data Mining, Logics for Data Mining, Wavelet Methods in Data Mining , Fractal Mining - Self Similarity-based Clustering and its Applications, Visual Analysis of Sequences Using Fractal Geometry, Interestingness Measures - On Determining What Is Interesting, Quality Assessment Approaches in Data Mining, Data Mining Model Comparison, Data Mining Query Languages

Unit III

Advanced Methods - Mining Multi-label Data, Privacy in Data Mining, Meta-Learning - Concepts and Techniques, Bias vs Variance Decomposition For Regression and Classification, Mining with Rare Cases, Data Stream Mining, Mining Concept-Drifting Data Streams, Mining High-Dimensional Data, Text Mining and Information Extraction, Spatial Data Mining, Spatio-temporal clustering, Data Mining for Imbalanced Datasets: An Overview, Relational Data Mining, Web Mining, Review of Web Document Clustering Approaches, Causal Discovery, Ensemble Methods in Supervised Learning, Data Mining using Decomposition Methods, Information Fusion - Methods and Aggregation Operators, Collaborative Data Mining, Organizational Data Mining, Mining Time Series Data

Unit IV

Applications - Multimedia Data Mining, Data Mining in Medicine, Learning Information Patterns in Biological Databases – Stochastic Data Mining , Data Mining for Financial Applications, Data Mining for Intrusion Detection, Data Mining for CRM, Data Mining for Target Marketing, NHECD

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IV B.Tech I Semester			
Course Code	COMPUTER VISION CSE(AI&ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s): Linear algebra, Probability and Statistics, Programming, Machine learning		3	0	0	3

- Nano Health and Environmental Commented Database

Unit V

Software- Commercial Data Mining Software, Weka-A Machine Learning Workbench for Data Mining

Text Book:

1. Oded Maimon and Lior Rokach, "Data Mining and Knowledge Discovery Handbook, 2nd ed", Springer, 2010

Reference Books:

1. Ruhul A. Sarker, Hussein A. Abbass, Charles S. Newton," Heuristics and Optimization for Knowledge Discovery", Idea group publishing
2. Multimedia Data Mining: A Systematic Introduction to Concepts and Theory, 1st Edition, By Zhongfei Zhang, Ruofei Zhang

Web Resources:

1. https://www.researchgate.net/publication/236005657_Data_Mining_and_Knowledge_Discovery_Handbook_2nd_ed#fullTextFileContent

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1	3	-	-	2	2	-	2	-	-	-	2	-	2	1
CO 2	2	2	3	1	2	-	1	-	-	-	1	-	1	-
CO 3	1	2	1	2	1	-	2	-	-	-	2	-	2	-
CO 4	2	1	-	3	2	-	-	-	-	-	2	-	-	1

Course Objective (s):

1. To provide a comprehensive understanding of image processing and computer vision techniques.
2. To teach binary shape analysis, connectedness, object labeling and counting, size filtering, distance functions, skeletons and thinning, deformable shape analysis, and boundary tracking procedures.
3. To explain the Hough Transform for line detection, circular object detection, ellipse detection, and feature collation.
4. To explore methods for 3D vision and motion, including projection schemes, shape from shading, photometric stereo, shape from texture, and shape from focus.
5. To introduce surface representations, point-based representation, volumetric representations, 3D object recognition, 3D reconstruction, and motion analysis techniques.

Course Outcome(s):

On completion of the course, the students will be able to-

- CO-1: Recognize the fundamentals of image formation
- CO-2: Implement image processing and computer vision techniques
- CO-3: Perform feature detection and matching by patches, edges and lines
- CO-4: Apply segmentation techniques to practical applications such as face detection and recognition, surveillance
- CO-5: Capable of performing 2D and 3D Feature-based alignment

UNIT-I

Image formation: Geometric primitives and transformations-Geometric primitives 2D Transformations, 3D transformations, 3D rotations, 3D to 2D Projections, Lens distortions. Photometric image formation-Lighting, Reflectance and shading, Optics. The digital camera-Sampling and aliasing, Color, Compression.

UNIT-II

Image processing: Point operators-Pixel transforms, Color transforms, Compositing and matting, Histogram equalization, Linear filtering-separable filtering, Examples of linear filtering, Band-pass and steerable filters, More neighborhood operators-Nonlinear filtering, Morphology, Distance transforms, Connected components, Fourier transforms-Fourier transform pairs, Two-dimensional Fourier transforms, Wiener filtering, Pyramids and wavelets-Interpolation, Decimation, Multi-resolution representations, wavelets.

UNIT-III

Feature detection and matching- Points and patches-feature detectors, feature descriptors, feature matching, feature matching, feature tracking, Edges-Edge detection, Edge linking , Lines-successive approximation, Hough transforms, Vanishing points

UNIT-IV

Segmentation- Active contours-snakes, Dynamic snakes and condensation, scissors, level sets, Split and merge-watershed, region splitting, region merging, graph based segmentation, probabilistic aggregation, Mean shift and mode finding-k-means and mixture of Gaussians, Mean shift, Normalized cuts, Graph cuts and energy-based methods

UNIT-V

Feature-based alignment: 2D and 3D feature-based alignment-2D alignment using least squares, Iterative algorithms, Robust least squares and RANSAC, 3D alignment, Pose estimation-linear algorithms, Iterative algorithms, Geometric intrinsic calibration-calibration patterns, vanishing points, rotational motion, radial distortion

TEXT BOOKS

1. Computer Vision: Algorithms & Applications, R. Szeliski, Springer, 2010
2. Multiple View Geometry in Computer Vision: R. Hartley and A. Zisserman, Cambridge University Press, 2004
3. Computer Vision a Modern approach- second edition David A. Forsyth, Jean Ponce
4. E. R. Davies, —Computer & Machine Vision, Fourth Edition, Academic Press, 2012.

REFERENCE BOOKS

1. D. L. Baggio et al., —Mastering OpenCV with Practical Computer Vision Projects, Packt Publishing, 2012.
2. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Third Ed., Prentice-Hall, 2008

3. Jan Erik Solem, —Programming Computer Vision with Python: Tools and algorithms for analyzing images, O'Reilly Media, 2012.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc19_cs58/preview

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	2	2	-	2	-	-	-	2	-	2	1
CO2	2	2	3	1	2	-	1	-	-	-	1	-	1	-
CO3	1	2	1	2	1	-	2	-	-	-	2	-	2	-
CO4	2	1	-	3	2	-	-	-	-	-	2	-	-	1
CO5	3	2	-	-	2	1	-	-	-	-	1	-	-	1

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IV B.Tech I Semester			
Course Code	QUANTUM COMPUTING CSE(AI&ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s):-Prior knowledge of probability theory and classical information theory		3	0	0	3

Course Objectives

1. To study the algorithmic aspects of quantum information.
2. To find new algorithms for quantum computers and new quantum communication protocols that are more efficient than the classical protocols.
3. To understand concrete problems that may have fast quantum algorithms and develop methods for constructing quantum algorithms.
4. To find the minimum conditions under which universal quantum computation is possible.

Course Outcomes

Upon completion of the course, the student should be able to:

- CO-1:** Analyze the behavior of basic quantum algorithms
- CO-2:** Implement simple quantum algorithms and information channels in the Quantum circuit model
- CO-3:** Simulate a simple quantum error-correcting code
- CO-4:** Prove basic facts about quantum information channels

Unit I

Introduction: Quantum Measurements Density Matrices, Positive-Operator Valued Measure, Fragility of quantum information: Decoherence, Quantum Superposition and Entanglement, Quantum Gates and Circuits.

Unit II

Quantum Basics and Principles: No cloning theorem & Quantum Teleportation, Bell's inequality and its implications, Quantum Algorithms & Circuits.

Unit III

Algorithms: Deutsch and Deutsch-Jozsa algorithms, Grover's Search Algorithm, Quantum Fourier Transform, Shor's Factorization Algorithm.

Unit IV

Performance, Security and Scalability: Quantum Error Correction: Fault tolerance; Quantum Cryptography, Implementing Quantum Computing: issues of fidelity; Scalability in quantum computing.

Unit V

Quantum Computing Models: NMR Quantum Computing, Spintronics and QED MODEL, Linear Optical MODEL, Nonlinear Optical Approaches; Limits of all the discussed approaches, Future of Quantum computing.

Text Books:

1. Eric R. Johnston, Nic Harrigan, Mercedes and Gimeno-Segovia "Programming Quantum Computers: Essential Algorithms And Code Samples, SHROFF/ O'Reilly.
2. Dr. Christine Corbett Moran, Mastering Quantum Computing with IBM QX: Explore the

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IV B.Tech I Semester			
Course Code	WEB ENGINEERING CSE(AI&ML)				
Teaching	Total contact hours:48	L	T	P	C
Prerequisite(s): web technology		3	0	0	3

world of quantum computing using the Quantum Composer and Qiskit, Kindle Edition Packt

- 3 V.K Sahni, Quantum Computing (with CD), TATA McGrawHill.

Reference Books:

1. Chris Bernhardt, Quantum Computing for Everyone (The MIT Press).
2. Michael A. Nielsen and Issac L. Chuang, “Quantum Computation and Information”, Cambridge (2002).
3. Riley Tipton Perry, “Quantum Computing from the Ground Up”, World Scientific Publishing Ltd (2012).
4. Scott Aaronson, “Quantum Computing since Democritus”, Cambridge (2013).
5. P. Kok, B. Lovett, “Introduction to Optical Quantum Information Processing”, Cambridge.

Web Reference:

1. <https://csis.pace.edu/~ctappert/cs837-19spring/QC-textbook.pdf>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	2	2	-	2	-	-	-	2	-	2	1
CO2	2	2	3	1	2	-	1	-	-	-	1	-	1	-
CO3	1	2	1	2	1	-	2	-	-	-	2	-	2	-
CO4	2	1	-	3	2	-	-	-	-	-	2	-	-	1

Course Objectives

1. Understand the characteristics of web applications
2. Learn to Model web applications
3. Be aware of Systematic methods
4. Be familiar with the testing techniques for web applications
5. To be able to analyze and design comprehensive systems for the creation, dissemination, storage and retrieval.

Course Outcomes

By the end of this course, students should be able to:

- CO-1:** Apply the characteristics of web applications.
- CO-2:** Design and model web applications..
- CO-3:** Analyze and design comprehensive systems for the creation, dissemination, storage and retrieval.

CO-4: Able to build a E-commerce web site

Unit I

An Introduction to Web Engineering: History of web Development, Time line, Motivation, Categories of Web Applications, Characteristics of Web Applications. Evolution and Need for Web Engineering, Web Engineering Models, Software Engineering v/s Web Engineering. World Wide Web: Introduction to TCP/IP and WAP, DNS, Email, TelNet, HTTP and FTP. Introduction to Browser and search engines, Search fundamentals, Search strategies, Directories search engines and Meta search engines, working of the search engines, Miscellaneous Web Browser details

Unit II

Information Architecture: The role of the Information Architect, Collaboration and Communication, Organizing Information, Organizational Challenges, Organizing Web sites parameters and Intranets. Creating Cohesive Websites: Conceptual Overview Website Development, Website Design issues, Conceptual Design, High-Level Design, Indexing the Right Stuff, Grouping Content. Architectural Page Mockups, Design Sketches, Navigation Systems. Searching Systems Good & bad web design, Process of Web Publishing.

Unit III

Technologies for Web Applications: HTML and DHTML, HTML Basic Concepts, Static and dynamic HTML, Structure of HTML documents, HTML Elements, Linking in HTML, Anchor Attributes, Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text, Fonts, Tables, Frames and layers, Audio and Video Support with HTML, Database integration, CSS, Positioning with Style sheets, Forms Control, Form Elements.

Unit IV

Technologies for Web Applications: Introduction of XML, Validation of XML documents, DTD, Ways to use XML, XML for data files, HTML Vs XML, Embedding XML into HTML documents, Converting XML to HTML for Display, Displaying XML using CSS and XSL, Rewriting HTML as XML, Relationship between HTML, SGML and XML, web personalization , Semantic web, Semantic Web Services, Ontology.

Unit V

E- Commerce, E-commerce Business Models, The Internet and World Wide Web: E-commerce Infrastructure, Building an E-commerce Web Site , Electronic Commerce environment and opportunities. Modes of Electronic Commerce, Approaches to safe Electronic Commerce ,Electronic Cash and Electronic Payment Schemes ,Online Security and Payment Systems, Ecommerce Marketing Concepts, Advertising on the Internet: issues and Technologies, Ecommerce Marketing Concepts Electronic Publishing issues, approaches, legalities and technologies

Text Books

1. Gerti Kappel, Birgit Proll, “Web Engineering”, John Wiley and Sons Ltd, 2006.
2. Roger S. Pressman, David Lowe, “Web Engineering”, Tata McGraw Hill Publication, 2007.
3. Guy W. Lecky-Thompson, “Web Programming”, Cengage Learning, 2008.

Reference Books

1. Chris Bates, “Web Programming: Building Internet Applications”, Third Edition, Wiley India Edition, 2007
2. John Paul Mueller, “Web Development with Microsoft Visual Studio 2005”, Wiley Dream tech, 2006.

Reference Link

1. <https://fennypotter.files.wordpress.com/2010/12/johnwileyandsonswengineering.pdf>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	2	2	-	2	-	-	-	2	-	2	1
CO2	2	2	3	1	2	-	1	-	-	-	1	-	1	-
CO3	1	2	1	2	1	-	2	-	-	-	2	-	2	-
CO4	2	1	-	3	2	-	-	-	-	-	2	-	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech – IV -I			
Course Code	Entrepreneurship for Engineers (Common to all Branches)				
Teaching	Total contact hours-45	L	T	P	C
Prerequisite(s): Knowledge of microeconomics, accounting, finance, management, marketing, and operations.		3	0	0	3

Course objectives:

The objective of Entrepreneurship for Engineers course provides the students with cutting-edge knowledge and skills on how to successfully develop captivating products and services to solve challenging problems in a highly uncertain environment, often under considerable time constraints with very limited resources. Students will be able to apply these skills in the context of both new ventures as well as in established companies..

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	Pick up about Foundation of Entrepreneurship Development and its theories
CO2:	Demonstrate an ability to engage in critical thinking by analyzing situations and constructing and selecting viable solutions to solve problems.
CO3:	Analyze the various aspects, scope and challenges under an entrepreneurial venture.
CO4:	Understand various steps involved in starting a venture and to explore marketing methods & new trends in entrepreneurship.
CO5:	Explain classification and types of entrepreneurs and the process of entrepreneurial project development.

UNIT I

Introduction to Entrepreneurship: Meaning and Definition, Importance and growth –Objectives, Characteristics, Requirements and Qualities of Entrepreneur-Need of Entrepreneurship, Role of Entrepreneurship, Ethics and Social Responsibilities. corporate entrepreneurship – mobility of entrepreneur – entrepreneurial motivation. Agencies involved in entrepreneurship (SIDO, MDI, EDI, AISSIB, NIESBUD etc.,)

UNIT II

Creative and Entrepreneurial Plan: Creating and starting the venture sources of new ideas, methods of generating ideas, creating problem solving, product planning and development process. The business plan: nature and scope of business plan, writing business plan, evaluating business plans, using and implementing business plans. marketing plan, financial plan and the organizational plan, Launching formalities.

UNIT III

Operation Issues: Financing and managing the new venture Sources of capital, record keeping, recruitment, motivating and leading teams, financial controls. marketing and sales controls.

UNIT IV

Financial Planning and Issues : New venture expansion strategies and Issues features and evaluation of joint ventures, acquisitions, merges, franchising. public issues, rights issues, bonus issues and stock splits. institutional support to entrepreneurship. role of directorate of Industries.

UNIT V

Production and Commercialization: Production and marketing management. selection of production techniques, plant utilization and maintenance,. inventory control, material handling and quality control. sales promotion and product pricing.

Text books:

1. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 5th Edition.
2. Dollinger: Entrepreneurship, 4/e, Pearson, 2004.

Reference books:

1. Vasant Desai: Dynamics of Entrepreneurial Development and management, Himalaya Publishing House, 2004.
2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
3. Robert J. Calvin: Entrepreneurial Management, TMH, 2004.
4. Gurmeet Naroola: The Entrepreneurial Connection, TMH, 2001.
5. Aruna Kaulgud: Entrepreneurship Management by. Vikas publishing house, 2003.
6. Thomas W. Zimmerer & Norman M. Scarborough: Essential of Entrepreneurship and small business management, PHI, 4/e, 2005.

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IV B.Tech I Semester			
Course Code 201HB796	UHV 2 - Understanding Harmony CSE, CSE (AI/ML), CSE (Cyber Security)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): ---		3	0	0	3

Course Objective(s):

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcome(s):

After completion of the course the student will be able to-

- CO-1: Become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- CO-2: They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Module 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
21. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people- friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Books

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th semester)			
Course Code	Introduction to Operations Research (Open Elective- IV)				
Teaching	Total contact hours- 45	L	T	P	C
Prerequisite(s): Mathematics		3	0	0	3

Course Objectives:

Students undergoing this course will be able to:

- Impart knowledge on various concepts of Operations Research and LP problems.
- Learn the solution methods of transportation, assignment and sequencing.
- Learn the solution methods of replacement and game theory problems.
- Understand inventory and waiting lines problems.
- Understand simulation methods.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe various operations research models and their applications.
CO2:	Solve various engineering and managerial problems of LPP, transportation, assignment, sequencing and replacement.
CO3:	Apply game theory in different competitive situations.
CO4:	Solve the problems related to theories of waiting line and inventory models.
CO5:	Apply the principles of dynamic programming and simulation framework to solve various decision making situations.

Syllabus:

UNIT –I

INTRODUCTION: Development, Definition, Characteristics and phases, Types of operation research models, Applications.

LINEAR PROGRAMMING PROBLEM: Linear programming problem formulation - Graphical solution -Simplex method -Artificial variables techniques -Two-phase method - Big-M method - Special cases: degeneracy, multiple optimal solution, infeasibility and unbounded solution, duality principle.

UNIT – II

TRANSPORTATION PROBLEMS: Formulation - Initial and optimal solutions for balanced and unbalanced transportation problems – Degeneracy in transportation problems.

ASSIGNMENT PROBLEMS: Formulation - Optimal solution - Variants of assignment problem- Traveling salesman problem.

SEQUENCING: Introduction, flow – Shop sequencing, n jobs through two machines, n jobs through three machines - Job shop sequencing, two jobs through ‘m’ machines.

UNIT – III

REPLACEMENT: Introduction – Replacement of items that deteriorate with time, when money value is not counted and counted, replacement of items that fail completely, group replacement.

THEORY OF GAMES: Introduction – Mini. max (max. mini) – Criterion and optimal strategy, solution of games with saddle points, rectangular games without saddle points, 2 x 2 games, dominance principle, m x 2 & 2 x n games, graphical method.

UNIT-IV

WAITING LINES: Introduction – Single channel, Poisson arrivals, exponential service times, with infinite population and finite population models, multichannel, Poisson arrivals, Exponential service times with infinite population single channel Poisson arrivals.

INVENTORY MODELS: Introduction, Deterministic inventory models – Static economic order quantity models, P-System, Q-System.

UNIT – V

DYNAMIC PROGRAMMING: Introduction – Bellman's principle of optimality, applications of dynamic programming, capital budgeting problem, shortest path problem.

SIMULATION: Definition, types of simulation models, phases of simulation, applications of simulation, inventory problems, advantages and disadvantages, simulation languages, problems on inventory and queuing models.

Text Books:

1. Operations Research, S.D.Sharma, Kedarnath, Ramnath&Co, 5th edition, 2008.
2. Operations Research -An Introduction, H.A. Taha., PHI, 8th edition, 2008

References:

1. Operations Research Theory & Applications, J.K.Sharma, Macmillan, 6th edition, 2013.
2. Operations Research, A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education, 2nd edition, 2014.
3. Operations Research, Methods & Problems, Maurice Saseini, ArhurYaspan& Lawrence Friedman, 1^s edition, 1959.
4. Operations Research, R.Pannerselvam, PHI Publications, 2nd edition, 2009.
5. Operations Research, S Kalavathy, Vikas Publishers, 4th edition, 2013.

CO-PO

Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	3	-	-	-	-	-	-	-
CO2	-	-	-	-	2	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	2	-

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY(Autonomous)	IV B.Tech I Semester			
Course Code 201CS781	Deep Learning using Python CSE, CSE (AI/ML), CSE (Cyber Security)				
Teaching	Total contact hours-32	L	T	P	C
Prerequisite(s): Python Programming		0	1	2	2

Course Objective(s):

1. To gain knowledge on the concepts of deep learning using python.
2. To acquire the knowledge on various application areas of computer vision, natural language processing, structured data, time series, audio data and video data.

Course Outcome(s):

After completion of the course the student will be able to-

- CO-1: Develop various applications using computer vision.
- CO-2: Develop various applications using structured data.
- CO-3: Develop different applications using time series analysis.
- CO-4: Design various applications using audio and video data.
- CO-5: Design various applications using natural language processing.

Implement the following programs using python programming

List of Experiments:

- Experiment 1: Write a program to implement hand written digit recognition with MNIST dataset.
- Experiment 2: Write a program to implement image captioning using Flickr 8K dataset.
- Experiment 3: Write a program to implement bi-directional LSTM with IMDB dataset.
- Experiment 4: Write a program to implement sentiment analysis using RMN.
- Experiment 5: Write a program to implement time series analysis using LSTM for weather prediction.
- Experiment 6: Write a program to implement time series analysis for house sales prediction.
- Experiment 7: Write a program to implement speech emotion detection.
- Experiment 8: Write a program to implement speaker recognition.
- Experiment 9: Write a program to implement movie review analysis with IMDB dataset.
- Experiment 10: Write a program to implement short text emotion detection using multiclass SVM.

Experiment 11: Write a program to implement cyber threat detection using deep learning.

Experiment 12: Write a program to implement image recognition with CNN using cifar10 dataset.

Web References:

1. <https://keras.io/examples/>
2. <https://stackabuse.com/image-recognition-in-python-with-tensorflow-and-keras/>

CO-PO Mapping

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3		3	2				1		
CO2	1	2	1	2	1	3					1	
CO3	1	2	3		3							1
CO4	2	1	2		1		3					
CO5	2	3	1		2							1