

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)
B.Tech-CSE(DATA SCIENCE)
(Effective for the batches admitted in 2022-23)

Semester I (First year)

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	BS	20ABS9901	Algebra & Calculus	3	0	0	3	30	70	100
2	BS	20ABS9902	Applied Physics	3	0	0	3	30	70	100
3	ES	20AES0501	Problem Solving and Programming	3	0	0	3	30	70	100
4	ES	20AES0301	Engineering Graphics	1	0	4	3	30	70	100
5	HS	20AHS9901	Communicative English	3	0	0	3	30	70	100
6	HS LAB	20AHS9902	Communicative English Lab	0	0	2	1.5	30	70	100
7	BS LAB	20ABS9907	Applied Physics Lab	0	0	3	1.5	30	70	100
8	ES LAB	20AES0503	Problem Solving and Programming Lab	0	0	3	1.5	30	70	100
			Total credits				19.5	240	560	800

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Semester II (First year)

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	BS	20ABS9904	Chemistry	3	0	0	3	30	70	100
2	BS	20ABS9911	Probability and Statistics	3	0	0	3	30	70	100
3	ES	20AES0505	Information Technology and Numerical Methods	3	0	0	3	30	70	100
4	ES	20AES0502	Data Structures	3	0	0	3	30	70	100
5	ES	20AES0509	Python Programming	1	0	4	3	30	70	100
6	ES LAB	20AES0506	Computer Science and Engineering Workshop	0	0	3	1.5	30	70	100
7	BS LAB	20ABS9909	Chemistry Lab	0	0	3	1.5	30	70	100
8	ES LAB	20AES0504	Data Structures Lab	0	0	3	1.5	30	70	100
9	MC	20AMC9903	Environmental Studies	3	0	0	0	30	0	30
			Total credits				19.5	270	560	830

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**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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Semester III (Second year) – AK20

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	BS	20ABS9914	Discrete Mathematical Structures	3	0	0	3	30	70	100
2	PC	20APC0503	Digital Electronics & Microprocessors	3	0	0	3	30	70	100
3	PC	20APC3201	Database Management Systems	3	0	0	3	30	70	100
4	PC	20APC3202	Advanced Python Programming for Data Science	3	0	0	3	30	70	100
5	ES	20AES0205	Basics of Electrical and Electronics Engineering	3	0	0	3	30	70	100
6	PC Lab	20APC3203	Database Management Systems Lab	0	0	3	1.5	30	70	100
7	PC Lab	20APC3204	Advanced Python Programming for Data Science Lab	0	0	3	1.5	30	70	100
8	ES Lab	20AES0206	Basics of Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
9	SC	20ASC3201	Exploratory Data Analysis with R	1	0	2	2	100	0	100
10	MC	20AMC9902	Constitution of India	3	0	0	0	30	0	30
Total credits							21.5	370	560	930

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Semester IV (Second year) – AK20

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	PC	20APC3205	Computer Organization	3	0	0	3	30	70	100
2	PC	20APC3206	Design And Analysis Of Algorithms	3	0	0	3	30	70	100
3	PC	20APC3207	Object Oriented Programming through Java	3	0	0	3	30	70	100
4	PC	20APC3208	Operating Systems	3	0	0	3	30	70	100
5	HS	20AHSMB01	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
6	HS	20AHS9905	Universal Human Values	2	1	0	3	30	70	100
7	PC Lab	20APC3209	Design And Analysis Of Algorithms Lab	0	0	3	1.5	30	70	100
8	PC Lab	20APC3210	Object Oriented Programming through Java Lab	0	0	3	1.5	30	70	100
9	PC Lab	20APC3211	Operating Systems Lab	0	0	3	1.5	30	70	100
10	SC	20ASC3202	Digital and Social Media Marketing	1	0	2	2	100	0	100
Total credits							24.5	370	630	1000

Community service Project with credits

(To visit the selected community to conduct survey (Socio-economic & domain survey) and conduct sensitization/awareness program/activities at the end of IV- semester before commencement of V-semester and complete immersion programme also during V-Semester and submit report in V - semester. Assessment will be done at the end of V-Semester).

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Semester V (Third year)

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	PC	20APC3212	Computer Networks	3	0	0	3	30	70	100
2	PC	20APC3213	Formal Languages & Automata Theory	3	0	0	3	30	70	100
3	PC	20APC3214	Software Engineering	3	0	0	3	30	70	100
4	OE-1	20APE0417 20AOE0303 20AOE9925	Sensors and IoT Optimization Techniques Deterministic & Stochastic Statistical Methods	3	0	0	3	30	70	100
5	PE-1	20APE3201 20APE3202 20APE3203	Data Warehousing and Mining Design Patterns Computer Graphics	3	0	0	3	30	70	100
6	PC Lab	20APC3215	Software Engineering Lab	0	0	3	1.5	30	70	100
7	PC Lab	20APC3216	Computer Networks Simulation Lab	0	0	3	1.5	30	70	100
8	SC	20ASC3203	Mobile Application Development	1	0	2	2	100	0	100
9	MC	20AMC9901	Biology for Engineers	2	0	0	0	30	0	30
10	CSP	20CSP3201	Community service project	0	0	0	1.5	100	0	100
Total credits							21.5	440	490	930

S. No	Professional Elective (12 weeks)	Open Elective (12 weeks)
1	The Joy Of Computing Using Python	Blockchain and its Applications
2	Software Testing	Introduction to Cyber Security
3	Privacy And Security In Online Social Media	Business analytics and data mining modeling using R.
4	Data analytics with python	Decision making with spread sheet
5	Development using UML, JAVA and Patterns.	Introduction To Wireless And Cellular Communications
6	Programming In Modern C++	Text, Textuality And Digital Media
7	Data Structure And Algorithms Using Java	Psychology Of Learning
8	Computational Complexity	Public Speaking
9	Cyber Security and Privacy	Organizational Behaviour
10	Ethical Hacking	Entrepreneurship
11	Parameterized Algorithms	Introduction to Film Studies
12	Computational number theory and algebra	Partition of India in print media and Cinema.
13	Hardware Security	Data Analysis and decision making
14	GPU architecture and programming	Education for sustainable development
15	Introduction to game theory and mechanism	Training and development
16	Statistical learning for reliability analysis	Literature Culture and Media
17	Advanced distributed systems.	Introduction to Cultural Studies
18	Secure computation: part-1	Science, Technology and Society
19	Secure computation: part-2	Human Resource Development
20	Pattern recognition and application	E- Business.

*Student shall register any number of MOOC courses listed by the department as approved by the BOS from III year. But student is required to submit the pass certificate on NPTEL platform for at least one course with in the Programme duration (Before IV-II examination notification released).

AIITS TPT. CSE (DS)

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Semester VI (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	PC	20APC3217	Artificial Intelligence	3	1	0	3	30	70	100
2	PC	20APC3218	Compiler Design	3	0	0	3	30	70	100
3	PC	20APC3219	Cloud Computing	3	0	0	3	30	70	100
4	PE-2	20APE3204 20APE3205 20APE3206	Machine Learning Real Time Operating Systems Agile Methodologies	3	0	0	3	30	70	100
5	PC Lab	20APC3220	Artificial Intelligence Lab	0	0	3	1.5	30	70	100
6	PC Lab	20APC3221	Compiler Design Lab	0	0	3	1.5	30	70	100
7	PC Lab	20APC3222	Cloud Computing Lab	0	0	3	1.5	30	70	100
8	SC	20ASC3204	Soft Skills	1	0	2	2	100	0	100
9	MC	20AMC9904	Professional Ethics and Human Values	3	0	0	0	30	0	30
Total credits							18.5	340	490	830
Industry Internship (Mandatory) for 6-8 Weeks duration during summer vacation										

AIATS TPT.

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Semester VII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	PE-3	20APE3207 20APE3208 20APE3209 20APE3210	Predictive Analytics Natural Language Processing Deep Learning Techniques Computer Vision	3	0	0	3	30	70	100
2	PE-4	20APE3211 20APE3212 20APE3213	Cryptography and Network Security Adhoc & Sensor Networks Distributed Systems	3	0	0	3	30	70	100
3	PE-5 CBCC	20APE3214 20APE3215 20APE3216	Data Analytics Software Project Management Linux Environment System	3	0	0	3	30	70	100
4	PE-6	20APE3217 20APE3218 20APE3219	Information Retrieval Techniques Soft Computing Principles of Data science	3	0	0	3	30	70	100
5	OE-3	20APE0407 20APE0411 20AOE3601 20APE0415	Digital Image Processing Embedded Systems Enabling Technologies for data science and analytics :IOT Wireless Communications	3	0	0	3	30	70	100
6	HE	20AOE0302 20AOE9901 20AHSMB02	Management Science English for Research Paper Writing Entrepreneurship Development	3	0	0	3	30	70	100
7	SC	20ASC3205	Devops	1	0	2	2	100	0	100
8	PR	20APR3201	Evaluation of Industry Internship(III-II Summer Internship)	0	0	0	3	100	0	100
Total credits							23	380	420	800

Semester VIII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	MOOCS	OE/PE		0	0	0	3	25	75	100
2	PR	20APR3202	Internship	0	0	0	3	100		100
3	PR	20APR3203	Project work	0	0	0	9	60	140	200
Total credits							15	185	215	400

LIST OF COURSES FOR HONOURS In B.Tech -CSE

Note: Students can choose a few courses from the following list approved by BOS either 3 credits/ 4 credits courses based on the availability in SWYAM-NPTEL portal, and secure minimum of 20 credits on passing the selected courses.

S.NO	SUB.CODE	COURSE NAME	WEEKS	CREDITS
1	20AHN3201	DESIGN AND IMPLEMENTATION OF HUMAN COMPUTER INTERFACES	12 Weeks	3 or 4
2	20AHN3202	SOCIAL NETWORKS	12 Weeks	3 or 4
3	20AHN3203	NO SQL DATABASES	12 Weeks	3 or 4
4	20AHN3204	ADVANCED IOT APPLICATIONS	12 Weeks	3 or 4
5	20AHN3205	INTRODUCTION TO INDUSTRY 4.0 AND INDUSTRIAL INTERNET OF THINGS	12 Weeks	3 or 4
6	20AHN3206	GETTING STARTED WITH COMPETITIVE PROGRAMMING	12 Weeks	3 or 4
7	20AHN3207	COMMUNICATION NETWORKS	12 Weeks	3 or 4
8	20AHN3208	COMPUTER NETWORKS AND INTERNET PROTOCOL	12 Weeks	3 or 4
9	20AHN3209	ALGORITHMIC GAME THEORY	12 Weeks	3 or 4
10	20AHN3210	SCALABLE DB.	12 Weeks	3 or 4
11	20AHN3211	APPLIED ACCELERATED ARTIFICIAL INTELLIGENCE.	12 Weeks	3 or 4
12	20AHN3212	AI: SEARCH METHODS FOR PROBLEM SOLVING.	12 Weeks	3 or 4
13	20AHN3213	ARTIFICIAL INTELLIGENCE: KNOWLEDGE REPRESENTATION AND REASONING	12 Weeks	3 or 4
14	20AHN3214	MULTI-CORE COMPUTER ARCHITECTURE-STORAGE	12 Weeks	3 or 4
15	20AHN3215	SOCIAL NETWORK ANALYSIS.	12 Weeks	3 or 4
		TOTAL		20

MINOR DEGREE IN COMPUTER SCIENCE AND ENGINEERING FOR ECE, EEE, CE & ME

Note: Students of other programmes to get “minor in CSE” shall pass a few SWAYAM-NPTEL courses listed below which are approved by BOS and obtain 15 credits and submitting a minor discipline project in CSE for scoring 5 credits is compulsory and all together total credits requirement count to be minimum of 20.

S.NO	SUB.CODE	COURSE NAME	WEEKS	CREDITS
1	20AMN3201	OPERATING SYSTEMS	12 Weeks	3 or 4
2	20AMN3202	COMPUTER ORGANIZATION	12 Weeks	3 or 4
3	20AMN3203	COMPUTER NETWORKS	12 Weeks	3 or 4
4	20AMN3204	DESIGN AND ANALYSIS OF ALGORITHMS	12 Weeks	3 or 4
5	20AMN3205	OBJECT ORIENTED PROGRAMMING THROUGH JAVA	12 Weeks	3 or 4
6	20AMN3206	PROGRAMMING IN MODERN C++	12 Weeks	3 or 4
7	20AMN3207	DATA ANALYTICS WITH PYTHON	12 Weeks	3 or 4
8	20AMN3208	SOFTWARE ENGINEERING	12 Weeks	3 or 4
9	20AMN3209	SOFTWARE PROJECT MANAGEMENT	12 Weeks	3 or 4
10	20AMN3210	INTRODUCTION TO DATABASE SYSTEMS	12 Weeks	3 or 4
11	20AMN3211	CLOUD COMPUTING	12 Weeks	3 or 4
12	20AMN3212	FOUNDATION OF CRYPTOGRAPHY	12 Weeks	3 or 4
13	20AMN3213	HARDWARE SECURITY	12 Weeks	3 or 4
14	20AMN3214	COMPUTER NETWORKS AND INTERNET PROTOCOL	12 Weeks	3 or 4
15	20AMN3215	COMMUNICATION NETWORKS	12 Weeks	3 or 4
16	20AMN3216	MINOR DISCIPLINE PROJECT IN CSE (COMPULSORY)	-	5
		TOTAL		20

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Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	BS	20ABS9901	Algebra & Calculus	3	0	0	3	30	70	100
2	BS	20ABS9902	Applied Physics	3	0	0	3	30	70	100
3	ES	20AES0501	Problem Solving and Programming	3	0	0	3	30	70	100
4	ES	20AES0301	Engineering Graphics	1	0	4	3	30	70	100
5	HS	20AHS9901	Communicative English	3	0	0	3	30	70	100
6	HS LAB	20AHS9902	Communicative English Lab	0	0	2	1.5	30	70	100
7	BS LAB	20ABS9907	Applied Physics Lab	0	0	3	1.5	30	70	100
8	ES LAB	20AES0503	Problem Solving and Programming Lab	0	0	3	1.5	30	70	100
			Total credits				19.5	240	560	800

AITS TPT. CSE

Course Code	Algebra and Calculus		L	T	P	C
20ABS9901			3	0	0	3
Pre-requisite	Matrices	Semester	I - I			
Course Outcomes (CO):						
CO1: Make use of matrix algebra techniques that is needed by engineers for practical application CO2: Utilize mean value theorems to real life problems. CO3: Interpret with functions of several variables which is useful in optimization. Variables which is useful in optimization. CO4: Analyze 2-dimensional and 3- dimensional concepts in coordinate systems CO5: utilize the concept of special functions.						
UNIT – I	Matrix Operations and Solving Systems of Linear Equations		12 Hrs			
Rank of a matrix by echelon form, Consistency of system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors of the matrix of the linear transformation and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.						
UNIT – II	Quadratic Forms and Mean Value Theorems		9 Hrs			
Diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation. Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems of functions of single variable with remainders (without proof);						
UNIT – III	Multivariable calculus		9 Hrs			
Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.						
UNIT – IV	Multiple Integrals		10 Hrs			
Double integrals, change of order of integration, double integration in polar coordinates, change of Variables in double integration (Cartesian to polar), areas of plane regions enclosed by plane curves. Evaluation of triple integrals (Cartesian coordinates only).						
UNIT – V	Special Functions		10 Hrs			
Beta and Gamma functions and their properties, relation between beta and gamma functions, Bessel functions, Bessel's equation, Recurrence formulae or $J_n(x)$, Generating function- Orthogonality of Bessels functions.						
Textbooks:						
1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017. 2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.						
Reference Books:						
1. Dr.T.K.V Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N Prasad, Mathematics – 1, S.Chand publications. 2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002. 3. B.V.Ramana, Higher Engineering Mathematics, Mc Graw Hill Education. 4. N.Bali, M.Goyal, C.Watkins, Advanced Engineering Mathematics, Infinity Science Press.						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Applied Physics		L	T	P	C
20ABS9902			3	0	0	3
Pre-requisite	Basics of Physics	Semester	I - II			
Course Outcomes (CO):						
<p>CO1: Analyze the intensity variation of light due to interference, diffraction and polarization</p> <p>CO2: Analyze and apply the concepts of LASERs and optical fibers.</p> <p>CO3: Infer the properties of dielectric and magnetic materials.</p> <p>CO4: Apply the fundamentals of semiconductors for device applications</p> <p>CO5: Implement the behavior of superconductors in diverse fields & interpret the properties of nanomaterials for multiple applications.</p>						
UNIT – I			10 Hrs			
Optics						
Interference of light -principle of superposition-Conditions for sustained Interference-Interference in thin films (reflected light) - Newton's Rings -Determination of Wavelength. Diffraction-Fraunhofer diffraction- Single slit and double slit- Diffraction Grating.						
Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization, Uniaxial and Biaxial Crystal, Double Refraction, Polarization by Double Refraction, Nicol Prism.						
UNIT – II			10 Hrs			
Lasers and Fiber Optics						
Lasers – Introduction – Characteristics – Spontaneous and Stimulated Emission – Einstein Coefficients – Population Inversion – Excitation Mechanism and Optical Resonator – He-Ne Laser –Nd: YAG Laser – Semiconductor Diode Laser – Applications of Lasers.						
Introduction to Optical Fibers – Total Internal Reflection – Critical angle of propagation –Acceptance angle – Numerical Aperture – Classification of fibers based on Refractive index profile – Propagation of electromagnetic wave through optical fiber – modes – importance of V-number-Attenuation, Block Diagram of Fiber optic Communication – Industrial Applications						
UNIT – III			8 Hrs			
Dielectric and Magnetic Materials						
Introduction—Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant-Types of polarizations: Electronic and Ionic,(Quantitative), Orientation Polarizations (Qualitative)- Frequency dependence of polarization-Lorentz (internal) field-Claussius-Mosotti equation-Applications of Dielectrics: Ferroelectricity.						
Introduction-Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability-Origin of permanent magnetic moment – Classification of Magnetic materials - Weiss theory of ferromagnetism (qualitative) – Hysteresis– soft and hard magnetic materials – Magnetic memory device applications .						
UNIT – IV			8 Hrs			
Semiconductors						
Origin of Energy bands (Qualitative)-Intrinsic and Extrinsic semiconductors –Direct and indirect band gap semiconductors- Density of charge carriers – Fermi energy--Dependence of Fermi energy on carrier concentration and temperature – Electrical conductivity – Drift and Diffusion currents – Continuity equation - Hall effect - Applications of Hall effect and Semiconductors.						
UNIT – V			10 Hrs			
Superconductors and Nonmaterial's						
Superconductors-Properties-Meissner's effect-BCSTheory(Qualitative) - Josephson effect (AC&DC)-Types of Superconductors-Applications of superconductors.						
Nanomaterials–Significance of nanoscale–: Physical, Mechanical, Magnetic, Optical properties of nanomaterials – Synthesis of nanomaterials:Top-down-Ball Milling, Bottom-up-Chemical vapour deposition–Characterization of nanomaterials : X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM)-Applications of Nanomaterials.						
Textbooks:						
<ol style="list-style-type: none"> 1. M. N. Avadhanulu, P. G. Kshirsagar &TVS Arun Murthy” A Text book of Engineering Physics”-S. Chand Publications,11th Edition2019. 2. B.K.Pandey and S.Chaturvedi, Engineering Physics, Cengage Learning,2012. 						
Reference Books:						
<ol style="list-style-type: none"> 1. K Thyagarajan “Engineering Physics”,-Mc Graw Hill Publishing Company Ltd, 2016 2. Shatendra Sharma, Jyotsna Sharma, “ Engineering Physics”, Pearson Education,2018 3. David J.Griffiths,“Introduction to Electrodynamics”-4/e, Pearson Education, 2014 4. T Pradeep, “A Text book of NanoScience and NanoTechnology”-Tata Mc Graw Hill 2013. 						
Online Learning Resources:						
www.nptel.ac.in						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AIITS TPT. CSE DS

Course Code	Problem Solving And Programming		L	T	P	C
20AES0501			3	0	0	3
Pre-requisite	Basic Mathematics	Semester	I - I			
Course Objectives:						
<ul style="list-style-type: none"> • Introduce the internal parts of a computer, and peripherals. • Introduce the Concept of Algorithm and use it to solve computational problems • Identify the computational and non-computational problems • Teach the syntax and semantics of a C Programming language • Demonstrate the use of Control structures of C Programming language • Illustrate the methodology for solving Computational problems 						
Course Outcomes (CO):						
CO1: Able to know interconnection of peripherals and connects of algorithms and flowcharts CO2: Able to know problem solving aspects, design and analysis of algorithm CO3: Able to know flow control, input output and implementation functions CO4: Able to solve computational problems using functions, array and pointers CO5: Able to organise real world heterogeneous data and apply searching ,sorting techniques with exception handling						
UNIT - I		8 Hrs				
Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU. Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.						
UNIT - II		9 Hrs				
Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, and the analysis of algorithms. Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.						
UNIT - III		8 Hrs				
Types, Operators, and Expressions: Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation. Input and output: standard input and output, formatted output-Printf, formatted input-Scanf. Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do- while, break and continue, Goto and labels. Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.						
UNIT - IV		9 Hrs				
Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers. Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations. Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k th smallest element						
UNIT - V		9 Hrs				
Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search. Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields. Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.						
Textbooks:						
<ol style="list-style-type: none"> 1. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press. 2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson. 						

3. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.

Reference Books:

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.

Online Learning Resources:

www.nptel.ac.in

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Engineering Graphics				L	T	P	C
20AES0301					1	0	4	3
Pre-requisite	NIL	Semester			I - I			
Course Outcomes (CO):								
CO1: Draw various curves applied in Engineering CO2: Draw the projection of points and lines located in different quadrants. CO3: Draw the projection of planes and solids located in different quadrants. CO4: Draw sectional views and develop surfaces of a given object CO5: Draw orthographic projections and isometric projections.								
UNIT – I					8 Hrs			
Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions. a) Conic sections including the rectangular hyperbola- general method only, b) Cycloid, epicycloids and hypocycloid								
UNIT – II					9 Hrs			
Projection of points, lines: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line, traces								
UNIT – III					8 Hrs			
Projections of Planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces. Projections of Solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.								
UNIT – IV					9 Hrs			
Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections. Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.								
UNIT – V					9 Hrs			
Orthographic Projections: Systems of projections, conventions and application to orthographic projections. Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids.								
Textbooks and Reference Books:								
K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill Shah and Rana, Engineering Drawing, 2/e, Pearson Education Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill								
Online Learning Resources:								
YouTube: http://sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu								

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Communicative English		L	T	P	C
20AHS9901			3	0	0	3
Pre-requisite	Grammar and Literature	Semester	I - I			
Course Objectives:						
<ul style="list-style-type: none"> Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing 						
Course Outcomes (CO):						
CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English. CO2: Apply grammatical structures to formulate sentences and correct word forms CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions CO4: Evaluate reading/listening texts and to write summaries based on global comprehension of these texts. CO5: Create a coherent paragraph interpreting a figure/graph/chart/table						
UNIT - I				9 Hrs		
Lesson: On the Conduct of Life: William Hazlitt Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information. Writing: Beginnings and endings of paragraphs – introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. Grammar and Vocabulary- I : Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form – Wh questions; word order in sentences. Vocabulary -2: Formal/academic words and phrases.						
UNIT - II				9 Hrs		
Lesson: The Brook: Alfred Tennyson Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks. Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. Writing: Paragraph writing (specific topics) using suitable cohesive devices; Mechanics of writing – punctuation, capital letters. Grammar & Vocabulary building-1: Cohesive devices – linkers, sign posts and transition signals; use of articles and zero article; prepositions. Vocabulary building: 2 Idioms and Phrases, Homonyms, Homophones and Homographs.						
UNIT - III				9 Hrs		
Lesson: The Death Trap: Saki Listening: Listening for global comprehension and summarizing what is listened to. Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed Reading: Reading a text in detail by making basic inferences – recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Writing: Summarizing – identifying main idea/s and rephrasing what is read. Grammar and Vocabulary building-II: Direct and indirect speech, reporting verbs for academic purposes. Technical Writing-1: personal experiences, unforgettable incidents, travelogues. (Imaginative, Narrative and Descriptive)						
UNIT - IV				9 Hrs		
Lesson: Innovation: Muhammad Yunus Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) – asking for and giving information/directions Reading: Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicate processes or display complicated data. Writing: Letter Writing: Official Letters/Report writing, <i>e-mail writing</i> Grammar and Vocabulary: Quantifying expressions – adjectives and adverbs; comparing and contrasting; Voice –						

Active & Passive Voice.	
Vocabulary:2 : Jigsaw Puzzles, Vocabulary Activities through Web tools	
UNIT – V	9 Hrs
Lesson: Politics and the English Language: George Orwell	
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.	
Speaking: Formal oral presentations on topics from academic contexts – without the use of PPT slides.	
Reading: Reading for comprehension.	
Writing: Writing structured essays on specific topics using suitable claims and evidences.	
Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage.	
Technical Writing-2: Narrative short story, News paper articles on science fiction.	
Textbooks:	
1. Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan	
Reference Books:	
<ol style="list-style-type: none"> 1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014. 2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018. 3. Raymond Murphy’s English Grammar in Use Fourth Edition (2012) E-book 4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012. 5. Oxford Learners Dictionary, 12th Edition, 2011 6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014) 7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler 	
Online Learning Resources:	
<ol style="list-style-type: none"> 1. www.englishclub.com 2. www.easyworldofenglish.com 3. www.languageguide.org/english/ 4. www.bbc.co.uk/learningenglish 5. www.eslpod.com/index.html 6. www.myenglishpages.com 	

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Communicative English Lab		L	T	P	C
20AHS9902			0	0	2	1.5
Pre-requisite	Language and Grammar	Semester	I - I			
Course Objectives:						
<ul style="list-style-type: none"> Students will be exposed to a variety of self instructional, learner friendly modes of language learning. Students will learn better pronunciation through Phonetics. Students will be trained to use language effectively to face interviews, group discussions, public speaking. Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc. 						
Course Outcomes (CO):						
<p>CO1: Create Awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English</p> <p>CO2: Understanding the different aspects of the language with emphasis on LSRW skills and make use of different strategies in discussion</p> <p>CO3: Improve word knowledge and apply skills in various languages learning activities</p> <p>CO4: Analyze speech sounds, stress ,rhythm, intonation and syllable division for better listening and speaking comprehension</p> <p>CO5: Evaluate and exhibit acceptable etiquette essential in social and professional presentations.</p>						
UNIT - I						9 Hrs
<ol style="list-style-type: none"> Phonetics Non - verbal communication Vocabulary (word formation, one word substitutes, words often misused & confused, collocations idioms & phrases) 						
UNIT - II						9 Hrs
<ol style="list-style-type: none"> Reading Comprehension JAM Distinction between Native and Indian English accent (Speeches by TED and Kalam). 						
UNIT - III						9 Hrs
<ol style="list-style-type: none"> Situational dialogues/ Giving Directions Describing objects /places /persons 						
UNIT - IV						9 Hrs
<ol style="list-style-type: none"> Fun - Buzz (Tongue twisters, riddles, puzzles etc) Formal Presentations 						
UNIT - V						9 Hrs
<ol style="list-style-type: none"> Debate (Contemporary / Complex topics) Group Discussion 						
Software Source:						
K-Van Solutions Software						
Reference Books:						
Teaching English - British Council						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Applied Physics Lab			L	T	P	C
20ABS9907				0	0	3	1.5
Pre-requisite	Basic of Physics	Semester		I - I			
Course Outcomes (CO):							
<ul style="list-style-type: none"> CO1: Analyze the wave properties of light and the interaction of energy with the matter. CO2: Apply electromagnetic wave propagation in different guided media. CO3: Asses the electromagnetic wave propagation and its power in different media CO4: Analyze the conductivity of semiconductors. CO5: Interpret the difference between normal conductor and superconductor and apply the nanomaterials for engineering applications. 							
List of Experiments							
<ol style="list-style-type: none"> Determination of the thickness of the wire using wedge shape method. Determination of the radius of curvature of the lens by Newton's ring method Determination of wavelength by plane diffraction grating method Dispersive power of a diffraction grating Study of the Magnetic field along the axis of a circular coil carrying current. Study the variation of B versus H of the magnetic material (B-H curve) Determination of the numerical aperture of a given optical fiber and angle of acceptance. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect. Determination of the energy gap of a semiconductor Determination of crystallite size using X-Ray diffraction spectra. Determination of Wavelength of LASER using diffraction grating. Determination of particle size using LASER. Determination of the resistivity of semiconductor by Four probe method. Determination of dielectric constant by charging and discharging method. Study the temperature dependence of resistance of a thermister. 							
Textbooks:							
Reference Books:							
<ol style="list-style-type: none"> S. Balasubramanian, M.N.Srinivasan, "A Text book of Practical Physics"-S Chand Publishers, 2017. http://vlab.amrita.edu/index.php-VirtualLabs, Amrita University. 							
Online Learning Resources:							

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Problem Solving And Programming Lab		L	T	P	C
20AES0503			0	0	3	1.5
Pre-requisite	Basic Mathematics	Semester	I - I			
Course Objectives:						
The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.						
Course Outcomes (CO):						
CO1: Assemble and disassembling parts of a Computer CO2: Identify to control structure to solving the problem CO3: Analyze different sorting algorithms CO4: Design solutions for computational problems CO5: Develop C programs which utilize the memory efficiently using programming constructs like pointers.						
Laboratory Experiments #						
<ol style="list-style-type: none"> Assemble and disassemble parts of a Computer Design a C program which reverses the number Design a C program which finds the second maximum number among the given list of numbers. Construct a program which finds the kth smallest number among the given list of numbers. Design an algorithm and implement using C language the following exchanges $a \leftarrow b \leftarrow c \leftarrow d \leftarrow a$ Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them. Implement the C program which computes the sum of the first n terms of the series $\text{Sum} = 1 - 3 + 5 - 7 + 9$ Design a C program which determines the numbers whose factorial values are between 5000 and 32565. Design an algorithm and implement using a C program which finds the sum of the infinite series $1 - x^2/2! + x^4/4! - x^6/6! + \dots$ Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa. Develop an algorithm which computes the all the factors between 1 and 100 for a given number and implement it using C. Construct an algorithm which computes the sum of the factorials of numbers between m and n. Design a C program which reverses the elements of the array. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The stars for each number should be printed horizontally. Implement the sorting algorithms a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort. Illustrate the use of auto, static, register and external variables. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers. Design a C program which sorts the strings using array of pointers. 						
Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.						
Textbooks:						
<ol style="list-style-type: none"> Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson. 						
Reference Books:						
<ol style="list-style-type: none"> B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", Tata McGraw-Hill, 2nd edition, 2002. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson. 						
Online Learning Resources:						
www.nptel.ac.in/cprogramming						

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	2							2				2	
C02	2	2	2										2	
C03	2	2											2	
C04	2	2	3	2									2	2
C05	2	2	3	3	2							3	2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AIITS TPT. CSE (DS)

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)
B.Tech-CSE(DATA SCIENCE)
(Effective for the batches admitted in 2022-23)**

Semester II (First year)

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	BS	20ABS9904	Chemistry	3	0	0	3	30	70	100
2	BS	20ABS9911	Probability and Statistics	3	0	0	3	30	70	100
3	ES	20AES0505	Information Technology and Numerical Methods	3	0	0	3	30	70	100
4	ES	20AES0502	Data Structures	3	0	0	3	30	70	100
5	ES	20AES0509	Python Programming	1	0	4	3	30	70	100
6	ES LAB	20AES0506	Computer Science and Engineering Workshop	0	0	3	1.5	30	70	100
7	BS LAB	20ABS9909	Chemistry Lab	0	0	3	1.5	30	70	100
8	ES LAB	20AES0504	Data Structures Lab	0	0	3	1.5	30	70	100
9	MC	20AMC9903	Environmental Studies	3	0	0	0	30	0	30
Total credits							19.5	270	560	830

AITS TPT.

Course Code	Chemistry		L	T	P	C
20ABS9904			3	0	0	3
Pre-requisite	Basics of chemical formulas and equations	Semester	I – II			
Course Outcomes (CO):						
CO1: Interpret the behaviour and interactions between matter and energy at both the atomic and molecular levels between matter and energy at both the atomic and molecular levels CO2: Apply the electrochemical principles to the construction of batteries, fuel cells and electrochemical sensors CO3: Outline the preparation, mechanism, properties and applications of polymer and conducting polymer CO4: Analyze the separation of gaseous and liquid mixtures using instrumental methods and their applications CO5: Understand the disadvantages of using hardwater in domestically and industrially and select suitable treatment						
UNIT – I	Structure and Bonding Models		10 Hrs			
Planck's quantum theory, Schrodinger wave equation, significance of Ψ^1 and Ψ^2 , applications to hydrogen, particle in a box and their applications for conjugated molecules, crystal field theory – salient features – energy level diagrams for transition metal ions – splitting of orbital's in tetrahedral and octahedral complexes, magnetic properties, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 , N_2 and CO , calculation of bond order.						
UNIT – II	Electrochemistry and Applications		10 Hrs			
Electrodes – concepts, concept of redox-reactions, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, concept of pH, pH meter and applications of pH metry (acid-base titrations), potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, alkali metal sulphide batteries, button cells, Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells. Secondary cells – lead acid, nickel-metal hydride and lithium ion batteries- working of the batteries including cell reactions						
UNIT – III	Polymer Chemistry		10 Hrs			
Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation. Plastics - Thermoplastics and Thermo settings, Preparation, properties and applications of – Bakelite, urea-formaldehyde, Nylon-66, carbon fibres, Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.						
UNIT – IV	Instrumental Methods and Applications		10 Hrs			
Beer-Lambert's law,, Principle and applications of UV-Visible spectrophotometer, Principle and applications of Colorimetry, AAS, AES, Instrumentation ,Principles and applications of Chromatographic techniques(GC & HPLC), Methods for separation of gaseous mixtures and liquid mixtures.						
UNIT – V	Water Technology		10 Hrs			
Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - scale and sludge, Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.						
Textbooks:						
1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013. 2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010. 3. Engineering Chemistry by G V Subba Reddy, K N Jayaveera and C Ramachandraiah, Mc Graw Hill education(India) Private Limited.						
Reference Books:						
1. J. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008. 2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007. 3. Ben L. Feringa and Wesley R. Browne, Molecular Switches, 2/e, Wiley-VCH, 2011. 4. Willard Merritt Dean Settle, 7 th Edition Instrumental methods for analysis						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Probability And Statistics				L	T	P	C
20ABS9911					3	0	0	3
Pre-requisite	Probability	Semester		I - II				
Course Outcomes (CO):								
CO1: Interpret the characteristics through correlation and regression tools. CO2: Make use of the concepts of probability and their applications. CO3: Apply discrete and continuous probability distributions. CO4: Inference the components of a classical hypothesis test for large sample CO5: Inspect the components of a classical hypothesis test for small samples.								
UNIT - I					10 Hrs			
Descriptive statistics and methods for data science								
Data science, Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Type of variable: dependent and independent Categorical and Continuous variables, Data visualization, Measures of Central tendency, Measures of Variability (spread or variance) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, principle of least squares, method of least squares, regression lines								
UNIT - II					8 Hrs			
Probability								
Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.								
UNIT - III					8 Hrs			
Probability distributions								
Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties.								
UNIT - IV					8 Hrs			
Estimation and Testing of hypothesis, large sample tests								
Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems								
UNIT - V					8 Hrs			
Small sample tests								
Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for goodness of fit.								
Textbooks:								
1. Miller and Friends, Probability and Statistics for Engineers, 7/e, Pearson, 2008. 2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.								
Reference Books:								
1. S. Chand ,Probability and Statistics, Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S. Ranganatham, Dr.M.V.S.S.N. Prasad 2. S. Ross, a First Course in Probability, Pearson Education India, 2002. 3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.								
Online Learning Resources:								
www.nptel.ac.in								

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Information Technology And Numerical Methods		L	T	P	C
20AES0505			3	0	0	3
Pre-requisite	Basic Computer Knowledge	Semester	I - II			
Course Outcomes (CO):						
CO1: Usage of Digital World and Exploring Cyber space CO2: Explain the needs of hardware and software required for a computation task. CO3: Peripheral devices, networking and internet concepts						
UNIT - I						8 Hrs
INTRODUCTION TO INFORMATION TECHNOLOGY Your Digital World: The Practical User: How Becoming Computer Savvy Benefits You, Information Technology & Your Life: The Future Now, Infotech Is All Pervasive: Cell phones, Email, the Internet, & the E-World, The "All-Purpose Machine": The Varieties of Computers, Understanding Your Computer: How Can You Customize (or Build) Your Own PC?, Where Is Information Technology Headed? THE INTERNET & THE WORLD WIDE WEB Exploring Cyberspace: Connecting to the Internet: Narrowband, Broadband, & Access Providers, How Does the Internet Work? The World Wide Web, Email & Other Ways of Communicating over the Net, The Online Gold Mine: Telephony, Multimedia, Webcasting, Blogs, E-Commerce, & the Social Web, The Intrusive Internet: Snooping, Spamming, Spoofing, Phishing, Pharming, Cookies, & Spyware.						
UNIT - II						9 Hrs
SOFTWARE Tools for Productivity & Creativity: SOFTWARE: TOOLS FOR PRODUCTIVITY & CREATIVITY, System Software: The Power Behind the Power, The Operating System: What It Does? Other System Software: Device Drivers & Utility Programs, Common Features of the User Interface, Common Operating Systems, Application Software: Getting Started, Word Processing, Spreadsheets, Database Software, Specialty Software HARDWARE: THE CPU & STORAGE How to Choose a Multimedia Computer System: HARDWARE: THE CPU & STORAGE: HOW TO CHOOSE A MULTIMEDIA COMPUTER SYSTEM, Microchips, Miniaturization, & Mobility, the System Unit: The Basics, More on the System Unit, Secondary Storage, Future Developments in Processing & Storage						
UNIT - III						8 Hrs
HARDWARE: INPUT & OUTPUT Taking Charge of Computing & Communications: Input & Output, Input Hardware, Output Hardware, Input & Output Technology & Quality of Life: Health & Ergonomics, The Future of Input & Output COMMUNICATIONS, NETWORKS, & SAFEGUARDS The Wired & Wireless World: From the Analog to the Digital Age, Networks, Wired Communications Media, Wireless Communications Media, Cyber Threats, Hackers, & Safeguards						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

20AES0505	Numerical Methods	
Pre-requisite	Basic Statistics	I-I
Course Outcomes:		
<p>CO4: Analyze the concepts of Errors, Algebraic & Transcendental Equations to solve different Engineering problems</p> <p>CO5: Analyze Interpolation using the concepts of the numerical methods and apply the Integration in numerical methods</p> <p>CO6: Apply the concepts of O.D.E on numerical method</p>		
UNIT – I		8 Hrs
<p>Errors in Numerical computations: Errors and their Accuracy, Mathematical Preliminaries, Errors and their Analysis, Absolute, Relative and Percentage Errors, A general error formula, Error in a series approximation.</p> <p>Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation: Crout’s triangularisation method, Gauss - Seidal iteration method.</p>		
UNIT – II		8 Hrs
<p>Interpolation: Newton’s forward and backward interpolation formulae – Lagrange’s formulae. Gauss forward and backward formula, Stirling’s formula, Bessel’s formula.</p> <p>Curve fitting: Fitting of a straight line – Second degree curve – Exponential curve-Power curve by method of least squares. Numerical Differentiation for Newton’s interpolation formula. Numerical Integration: Trapezoidal rule – Simpson’s 1/3 Rule – Simpson’s 3/8 Rule.</p>		
UNIT – III		8 Hrs
<p>Numerical solution of Ordinary Differential equations: Solution by Taylor’s series-Picard’s Method of successive Approximations-Euler’s Method- Runge - Kutta Methods. Numerical solutions of Laplace equation using finite difference approximation. Initial Value Problem, Eigen Value Problem and Boundary-value Problem</p>		
Textbooks:		
<ol style="list-style-type: none"> Using Information Technology 9th Edition By Brian Williams and Stacey Sawyer, Mcgraw Hill Publications “Computer Oriented Numerical Methods” by V Rajaraman 		
Reference Books:		
<ol style="list-style-type: none"> Uttam K Roy, –Web Technologies!, Oxford University Press, 1st Edition, 2010. HTML and CSS: Design and Build Websites 1st Edition by Jon Duckett (Author) india price Steven Holzner, –The Complete Reference PHP!, Tata McGraw-Hill, 1st Edition, 2007. HTML & CSS: The Complete Reference, Fifth Edition (Complete Reference Series) Deitel and Deitel and Nieto, –Internet and World Wide Web - How to Program!, Prentice Hall, 5 th Edition, 2011. Numerical Methods by E Balaguruswamy 		
Online Learning Resources:		
<ol style="list-style-type: none"> http://www.scoopworld.in http://www.sxecw.edu.in http://www.technofest2u.blogspot.com http://www.ptutorial.com/php-example/php-upload-image http://www.ptutorial.com/php-example/php-change-case https://www.math.ust.hk/~machas/numerical-methods.pdf 		

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO4	3													
CO5	3													
CO6	3													

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Data Structures		L	T	P	C
20AES0502			3	0	0	3
Pre-requisite	C Programming, Mathematics	Semester	I - II			
Course Objectives:						
<ul style="list-style-type: none"> To teach the representation of solution to the problem using algorithm To explain the approach to algorithm analysis To introduce different data structures for solving the problems To demonstrate modelling of the given problem as a graph To elucidate the existing hashing techniques 						
Course Outcomes (CO):						
CO1: Analyze and evaluate the efficiency of an algorithm CO2: Implement linear data structures CO3: implement non -linear data structures CO4: Solve the problem of efficiently using graphs and Hashing techniques CO5: Implement advanced sorting and organizing the file						
UNIT - I						9 Hrs
Introduction						
Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Quick sort, how fast can we sort, Merge sort, Heap sort						
UNIT - II						9 Hrs
Stack, Queue and Linked lists						
Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.						
UNIT - III						9 Hrs
Trees						
Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. B-Trees: B- Trees, B + Trees.						
UNIT - IV						9 Hrs
Graphs and Hashing						
The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.						
UNIT - V						9 Hrs
Files and Advanced sorting						
File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization. Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.						
Textbooks:						
<ol style="list-style-type: none"> Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures in C", 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004. Alan L. Tharp, "File Organization and Processing", Wiley and Sons, 1988. 						
Reference Books:						
<ol style="list-style-type: none"> D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016 Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005. 						
Online Learning Resources:						
www.nptel.ac.in						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Python Programming		L	T	P	C
20AES0509			1	0	4	3
Pre-requisite	Problem Solving and Programming	Semester	I - II			
Course Outcomes (CO):						
<p>CO1: Understand the Python syntax, semantics, basic programming constructs to be used to write the programs</p> <p>CO2: Utilize the methods of various data structures to manipulate the data</p> <p>CO3: Apply various packages to work with real need</p> <p>CO4: Apply the appropriate Object-Oriented Programming principle for a given scenario</p> <p>CO5: Develop bug free applications by handling different types of exceptions</p>						
UNIT - I			9 Hrs			
<p>Basics of Python Programming: Features and applications of Python, Comparison with C, Literals, variables and identifiers, data types, comments, reserved words, indentation, operators, Input and Output Statements, type conversion.</p> <ul style="list-style-type: none"> Write a program to demonstrate different representations of numbers in Python. Write a program to perform different Operations on operators in Python 						
UNIT - II			9 Hrs			
<p>Decision Control Statements: Introduction, selection/conditional branching statements, basic loop structures/iterative statements, nested loops, break, continue and pass statements, else statement used with loops.</p> <p>Strings: operations and methods, Lists: accessing and updating values in list, nested and cloning lists, basic list operations, list methods, list comprehensions, looping in lists, Tuples, Sets, Dictionaries and Operations.</p> <ul style="list-style-type: none"> Develop programs to demonstrate decision making and looping structures in python. Write a program to create, append, and remove lists in Python. Write a program to demonstrate working with tuples in python. Write a program to demonstrate working with dictionaries in python. <p>Case study on Loops:</p> <ul style="list-style-type: none"> A perfect number is a number for which the sum of its proper divisors is exactly equal to the number. For example, the sum of the proper divisors of 28 would be $1 + 2 + 4 + 7 + 14 = 28$, which means that 28 is a perfect number. A number n is called deficient if the sum of its proper divisors is less than n and it is called abundant if this sum exceeds n. Write a program for the given large n, find the sum of all perfect numbers, sum of all deficient numbers and sum of abundant numbers separately. Print all perfect numbers along with its sum, deficient numbers along with its sum and abundant numbers along with its sum. 						
UNIT - III			9 Hrs			
<p>Functions: Introduction, Declaration and definition, calling a function, returning values from function, pass by object reference, arguments, Local and Global variables, recursive functions, lambda functions, fruitful functions.</p> <p>Libraries: NumPy, pandas, Keras.</p> <ul style="list-style-type: none"> Develop Python programs using recursive and non-recursive functions Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy <p>Case study on Functions:</p> <ul style="list-style-type: none"> Write a function <code>mult_lists(a, b)</code> that takes two lists of numbers of the same length, and returns the sum of the products of the corresponding elements of each. 						
UNIT - IV			9 Hrs			
<p>Classes and Objects: Introduction, classes and objects, constructor, encapsulation, Class method and self-argument, <code>__init__()</code> method, class variables and object variables, <code>__del__()</code> method, other special method, public and private data members, private methods, built-in class functions and attributes, overloading methods, overriding methods.</p> <ul style="list-style-type: none"> Write a program to demonstrate how to create classes and objects in the application. <p>Case study on Classes</p> <ul style="list-style-type: none"> Design a class named <code>QuadraticEquation</code> for a quadratic equation $ax^2+bx+c=0$. The class contains: <ul style="list-style-type: none"> The private data fields a, b, c that represents three coefficients. A constructor for the arguments for a, b and c Three get methods for a, b and c A method named <code>getDiscriminant()</code> that returns the discriminant, which is b^2-4ac. The methods named <code>getRoot1()</code> and <code>getRoot2()</code> for returning the two roots of the equation using the formulas: $R_1 = -b + (\sqrt{b^2-4ac})/2a$ and $R_2 = -b - (\sqrt{b^2-4ac})/2a$. These methods are useful only if the discriminant is non negative. Let these methods return 0 if the discriminant is negative. Write a test program that prompts the user to enter values for a, b, c and displays the result based on discriminant. 						

UNIT – V	9 Hrs
<p>Inheritance: Introduction, inheriting classes in python, types of inheritance, complex objects, abstract classes and interfaces. Error and Exception Handling: Types of Errors, Exceptions, Handling Exceptions, types of exceptions</p> <p>Files & Database: Introduction to File Input and Output, Using Loops to Process Files, Introduction to database, standard methods, working with oracle database, case study (create employees table in the oracle database).</p> <ul style="list-style-type: none"> • Develop Python programs to exemplify the concepts of inheritance and overloading. • Write a program to create user defined exception and handle the exception in the application. <p>Case study on Files</p> <ul style="list-style-type: none"> • Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be the input that to be written to the second file. 	
Textbooks:	
<ol style="list-style-type: none"> 1. Allen B. Downey, “Think Python”, 2nd edition, SPD/O’Reilly, 2016. 2. Reema thareja, Python Programming using problem solving approach, Oxford University Press. 	
Reference Books:	
<ol style="list-style-type: none"> 1. Dietel and Dietel, Python How to Program. 2. Kenneth A. Lambert, B.L. Juneja, Fundamentals of Python, Cengage Learning 3. James Payne, Beginning Python using Python2.6 and Python3 	
Online Learning Resources:	
<ol style="list-style-type: none"> 1. https://www.python.org 2. https://learnpython.org 	

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Computer Science And Engineering Workshop		L	T	P	C
20AES0506			0	0	3	1.5
Pre-requisite	Basic Computer Knowledge	Semester	I - II			
Course Outcomes (CO):						
<p>CO1: Assemble and disassembling parts of a computer CO2: Develop Documents using Word processors CO3: Develop presentations using the presentation tool CO4: Perform computations using spreadsheet tool CO5: Design Graphics, Videos and Web pages</p>						
Preparing your computer						
<p>Task 1: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.</p>						
<p>Task 2: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.</p>						
Productivity tools						
<p>Task 3: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.</p>						
<p>Task 4: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.</p>						
<p>Task 5: Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.</p>						
IoT						
<p>Task 6: Raspberry Pi Study the architecture of Raspberry pi, configure software, Install SD card, Connect the cables, Install Raspbian (or any other) operating system, Configure Wi-Fi, Remotely connect to your Raspberry Pi.</p>						
Story Telling						
<p>Task 7: Storytelling Use Adobe spark or any other tool to create Graphics, Webpages, and Videos.</p>						
Reference Books:						
<ol style="list-style-type: none"> 1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", 2nd edition, Tata McGraw-Hill, 2002 2. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI. 3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education. 4. Rusen, "Networking your computers and devices", PHI 5. Bigelows, "Trouble shooting, Maintaining & Repairing PCs", TMH. 						
Online Learning Resources:						
<ol style="list-style-type: none"> 1. https://www.adobe.com 2. https://www.raspberrypi.org 						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Chemistry Lab		L	T	P	C
20ABS9909			0	0	3	1.5
Pre-requisite	Basics of chemical formulas and equations	Semester	I - II			
Course Outcomes (CO):						
<p>CO1: Demonstrate volumetric analysis involved with emphasis on solution preparation, dilution and chemical calculations</p> <p>CO2: Develop knowledge to prepare advanced materials.</p> <p>CO3: Acquire knowledge to measure the strength an acid present in secondary batteries</p> <p>CO4: familiarize with digital and instrumental methods of analysis</p> <p>CO5: Apply important chemical concepts and principles to analyse mixture of components by chromatographic techniques</p>						
List of Experiments:						
<ol style="list-style-type: none"> Determination of Hardness of a groundwater sample. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method) Determination of pH metric titration of strong acid vs. strong base, Conductometric titration of strong acid vs. strong base Determination of Fe(II) in Mohr's salt by potentiometric method. Determination of percentage of Iron in Cement sample by colorimetry Determination of Strength of an acid in Pb-Acid battery Preparation of phenol-formaldehyde resin Preparation of TiO₂/ZnO nano particles Estimation of Calcium in port land Cement Adsorption of acetic acid by charcoal Thin layer chromatography 						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Data Structures Lab		L	T	P	C
20AES0504			0	0	3	1.5
Pre-requisite	Basic Mathematics	Semester	I - II			
Course Objectives:						
<ul style="list-style-type: none"> To introduce to the different data structures To elucidate how the data structure selection influences the algorithm complexity To explain the different operations that can be performed on different data structures To introduce to the different search and sorting algorithms. 						
Course Outcomes (CO):						
<ul style="list-style-type: none"> CO1: Select the data structure appropriate for solving the problem CO2: Implement searching and sorting algorithms CO3: Derive new data types CO4: Illustrate the working of linear and non linear data structure CO5: Organize the data using Files structure 						
Laboratory Experiments						
<ol style="list-style-type: none"> String operations using array of pointers Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List Stack implementation using arrays Stack implementation using linked lists Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank. Queue implementation using linked lists Creation of binary search tree, performing operations insertion, deletion, and traversal. Breadth first search Depth first search Travelling sales man problem File operations Indexing of a file Reversing the links (not just displaying) of a linked list. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table data type and support different operations on it. 						
Textbooks:						
<ol style="list-style-type: none"> Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures in C", 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004. Alan L. Tharp, "File Organization and Processing", Wiley and Sons, 1988. 						
Reference Books:						
<ol style="list-style-type: none"> D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005. 						
Online Learning Resources:						
https://www.youtube.com/watch?v=zWg7U00EaE&list=PLBF3763AF2E1C572F						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Environmental Studies		L	T	P	C
20AMC9903			3	0	0	0
Pre-requisite	Basic Environmental Knowledge	Semester	I - II			
Course Outcomes (CO):						
<p>CO1: Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.</p> <p>CO2: Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.</p> <p>CO3: Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.</p> <p>CO4: . Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage.</p> <p>CO5: To get knowledge on various environmental acts and to engage all the students life - long learning of rain water harvesting.</p>						
UNIT – I				18 Hrs		
<p>Multidisciplinary Nature of Environmental Studies: Introduction – Multidisciplinary Nature of Environmental Studies – Definition, Scope and Importance – Need for Public Awareness.</p> <p>Natural Resources: Renewable and non-renewable energy resources – Natural resources and associated problems.</p> <p>Forest resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people.</p> <p>Water resources: Use and over utilization of surface and sub-surface – Floods, drought, conflicts over water, dams – benefits and problems.</p> <p>Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.</p> <p>Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.</p> <p>Energy resources: Renewable and non-renewable energy resources.</p>						
UNIT – II				20 Hrs		
<p>Ecosystems: Concept of an ecosystem. – Structure and functions of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).</p> <p>Biodiversity And Its Conservation : Introduction- 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.</p>						
UNIT – III				10 Hrs		
<p>Environmental Pollution: Definition, Causes, effects and its control measures of : Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards.</p> <p>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, Tsunami and landslides.</p>						
UNIT – IV				15 Hrs		
<p>Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting and watershed management – Resettlement and rehabilitation of people – 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 – Public awareness.</p>						
UNIT – V				10 Hrs		
<p>Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.</p>						
Textbooks:						
<ol style="list-style-type: none"> 1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press. 2. Environmental Studies by Kaushik, New Age Publishers. 3. Environmental Studies by Sri Krishna Hitech publishing Pvt. Ltd. 						
Reference Books:						
<ol style="list-style-type: none"> 1. Environmental studies by R.Rajagopalan, Oxford University Press. 2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications. 						

3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

4. Environmental studies by A. Ravi Krishnan, G. Sujatha Sri Krishna Hitech publications.

Online Learning Resources:

www.nptel.ac.in

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AIATS TPT. CSE (DS)

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)
B.Tech-CSE(DATA SCIENCE)**

Semester III (Second year) – AK20

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	BS	20ABS9914	Discrete Mathematical Structures	3	0	0	3	30	70	100
2	PC	20APC0503	Digital Electronics & Microprocessors	3	0	0	3	30	70	100
3	PC	20APC3201	Database Management Systems	3	0	0	3	30	70	100
4	PC	20APC3202	Advanced Python Programming for Data Science	3	0	0	3	30	70	100
5	ES	20AES0205	Basics of Electrical and Electronics Engineering	3	0	0	3	30	70	100
6	PC Lab	20APC3203	Database Management Systems Lab	0	0	3	1.5	30	70	100
7	PC Lab	20APC3204	Advanced Python Programming for Data Science Lab	0	0	3	1.5	30	70	100
8	ES Lab	20AES0206	Basics of Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
9	SC	20ASC3201	Exploratory Data Analysis with R	1	0	2	2	100	0	100
10	MC	20AMC9902	Constitution of India	3	0	0	0	30	0	30
Total credits							21.5	370	560	930

AIATS TPT.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Discrete Mathematical Structures (common to CSE,CIC,AIDS,AIML,CSE(DS))				L	T	P	C
20ABS9914					3	0	0	3
Pre-requisite	Basic Mathematics	Semester		II-I				
Course Objectives:								
Introduce the concepts of mathematical logic and gain knowledge in sets, relations and functions and Solve problems using counting techniques and combinatorics and to introduce generating functions and recurrence relations. Use Graph Theory for solving real world problems.								
Course Outcomes (CO):								
After completion of the course, students will be able to CO1: Make use of mathematical logic to solve problems CO2: Analyze concepts and perform the operations related to sets, relations and functions. CO3: Identify basic counting techniques to solve combinatorial problems. CO4: Evaluate solutions by using recurrence relations. CO5: Utilize Graph Theory in solving computer science problems								
UNIT – I	Mathematical Logic				9 Hrs			
Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.								
UNIT – II	Set theory				9 Hrs			
Basic Concepts of Set Theory, Relations and Ordering, The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.								
UNIT – III	Elementary Combinatorics				9 Hrs			
Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.								
UNIT – IV	Recurrence Relations				9 Hrs			
Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.								
UNIT – V	Graphs				9 Hrs			
Basic Concepts, Isomorphism and Sub-graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four Color Problem								
Textbooks:								
<ol style="list-style-type: none"> 1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education. 2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002. 								
Reference Books:								
<ol style="list-style-type: none"> 1. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited. 2. Graph Theory with Applications to Engineering and Computer Science by Narsingh Deo. 								
Online Learning Resources:								
http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf								

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Digital Electronics & Microprocessors (common to CSE,CIC,AIDS,AIML,CSE(DS))	L	T	P	C
20APC0503		3	0	0	3
Pre-requisite	Semester	II-I			
Course Objectives:					
<ul style="list-style-type: none"> • To understand all the concepts of Logic Gates and Boolean Functions. • To learn about Combinational Logic and Sequential Logic Circuits. • To design logic circuits using Programmable Logic Devices. • To understand basics of 8086 Microprocessor and 8051 Microcontroller. • To understand architecture of 8086 Microprocessor and 8051 Microcontroller. • To learn Assembly Language Programming of 8086 and 8051. 					
Course Outcomes (CO):					
After Completion of this course, the student will be able to:					
CO1: Design Logic circuit using basic concepts of Boolean algebra.					
CO2: Design Logic circuit using basic concepts of PLDs.					
CO3: Design sequential logic circuits.					
CO4: Design application using 8086 Microprocessor.					
CO5: Design application using 8051 Microcontroller.					
UNIT - I	Number Systems & Code Conversion	9 Hrs			
Number Systems & Code conversion, Boolean Algebra & Logic Gates, Truth Tables, Universal Gates, Simplification of Boolean functions, SOP and POS methods – Simplification of Boolean functions using K-maps, Signed and Unsigned Binary Numbers.					
UNIT - II	Combinational Circuits	9 Hrs			
Combinational Logic Circuits: Adders & Subtractors, Multiplexers, Demultiplexers, Encoders, Decoders, Programmable Logic Devices.					
UNIT - III	Sequential Circuits	9 Hrs			
Sequential Logic Circuits: RS, Clocked RS, D, JK, Master Slave JK, T Flip-Flops, Shift Registers, Types of Shift Registers, Counters, Ripple Counter, Synchronous Counters, Asynchronous Counters, Up-Down Counter.					
UNIT - IV	Microprocessors - I	9 Hrs			
8085 microprocessor Review (brief details only), 8086 microprocessor, Functional Diagram, register organization 8086, Flag register of 8086 and its functions, Addressing modes of 8086, Pin diagram of 8086, Minimum mode & Maximum mode operation of 8086, Interrupts in 8086.					
UNIT - V	Microprocessors - II	9 Hrs			
Instruction set of 8086, Assembler directives, Procedures and Macros, Simple programs involving arithmetic, logical, branch instructions, Ascending, Descending and Block move programs, String Manipulation Instructions. Overview of 8051 microcontroller, Architecture, I/O ports and Memory organization, addressing modes and instruction set of 8051(Brief details only), Simple Programs.					
Text Books:					
<ol style="list-style-type: none"> 1. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5th Edition, 2013 2. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, John Wiley & Sons, Ltd., 2007. 3. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Microprocessor and Microcontrollers, Oxford Publishers, 2010. 4. Advanced microprocessors and peripherals-A.K Ray and K.M. Bhurchandani, TMH, 2nd edition, 2006. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Thomas L. Floyd, Digital Fundamentals – A Systems Approach, Pearson, 2013. 2. Charles H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th, Edition, 2004. 3. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition, 2006. 					
Online Learning Resources:					
NPTEL, SWAYAM					

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Database Management Systems (common to CSE,CIC,AIDS,AIML,CSE(DS))			L	T	P	C	
20APC3201				3	0	0	3	
Pre-requisite	NIL	Semester	II-I					
Course Objectives:								
This course is designed to:								
<ul style="list-style-type: none"> • Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques. • Enable students to model ER diagrams for any customized application • Inducting appropriate strategies for optimization of queries. • Provide knowledge on transaction and concurrency techniques 								
Course Outcomes (CO):								
After completion of the course, students will be able to								
CO1: know the fundamentals of Databases CO2: Understand SQL and PL/SQL Concepts CO3: Design a database for a real-world information system CO4: Process and Optimize the query CO5: Working of transaction and concurrency techniques in real time applications								
UNIT - I	Introduction, Introduction to Relational Model						9Hrs	
Introduction: Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database users and Administrators, Introduction to Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations								
UNIT - II	Introduction to SQL, Advanced SQL						9 Hrs	
Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Intermediate SQL: Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data types and schemas, Authorization. Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, OLAP, Formal relational query languages.								
UNIT - III	Database Design and the E-R Model, Relational Database Design						9 Hrs	
Database Design and the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues. Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms.								
UNIT - IV	Query Processing, Query optimization						9 Hrs	
Query Processing: Overview, Measures of Query cost, Selection operation, sorting, Join Operation, other operations, Evaluation of Expressions. Query optimization: Overview, Transformation of Relational Expressions, Estimating statistics of Expression results, Choice of Evaluation Plans, Materialized views, Advanced Topics in Query Optimization.								
UNIT - V	Transaction Management, Concurrency control and Recovery System						10Hrs	
Transaction Management: Transactions: Concept, A Simple Transactional Model, Storage Structures, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements. Concurrency Control: Lock-based Protocols, Deadlock Handling, Multiple granularity, Timestamp-based Protocols, and Validation-based Protocols. Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations.								
Textbooks:								
1. A. Silberschatz, H.F.Korth, S.Sudarshan, "Database System Concepts",6/e, TMH 2019								
Reference Books:								
1. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA 2. Database Principles Fundamentals of Design Implementation and Management, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning. 3. Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke, TMH								
Online Learning Resources:								
https://onlinecourses.nptel.ac.in/noc21_cs04/preview								

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AIITS TPT. CSE DS

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Advanced Python Programming for Data Science			L	T	P	C
20APC3202				3	0	0	3
Pre-requisite	NIL	Semester		II-I			
Course Objectives:							
This course is designed to:							
<ul style="list-style-type: none"> The main objective of this course is to help students learn, understand, and practice dataanalytics using python, which include the study of modern computingbig data technologies and scaling up machine learning techniques focusing on industryapplications. Mainly the course objectives are conceptualization and summarization of data. 							
Course Outcomes (CO):							
After completion of the course, students will be able to							
CO1: Write relatively advanced, well structured, computer programs in Python							
CO2: Gain familiarity with principles and techniques for optimizing the performance of numeric applications							
CO3: Understand parallel computing and how parallel applications can be written in Python							
CO4: Experiment with developing GPU accelerated Python applications							
CO5: Learn the fundamentals of the most widely used Python packages; including NumPy, Pandas and Matplotlib							
CO6: Apply programming concepts in Data Analysis and Data Visualization projects							
UNIT - I	The Role of Python in Data Science			9Hrs			
Introduction- Creating the Data Science Pipeline, Understanding Python's Role in Data Science, Learning to Use Python Fast, Setting Up Python for Data Science, Reviewing Basic Python							
UNIT - II	Conditioning and Working with Real Data			9 Hrs			
Uploading, Streaming, and Sampling Data, Accessing Data in Structured Flat-File Form, Sending Data in Unstructured File Form, Managing Data from Relational Databases, Interacting with Data from NoSQL Databases, Accessing Data from the Web, NumPy and pandas, Validating Your Data, Manipulating Categorical Variables, Dealing with Dates in Your Data, Slicing and Dicing: Filtering and Selecting Data, Aggregating Data at Any Level.							
UNIT - III	Shaping and Performing Action on Data			9 Hrs			
Working with HTML Pages, Working with Raw Text, Using the Bag of Words Model and Beyond, Working with Graph Data, Contextualizing Problems and Data, Considering the Art of Feature Creation, Performing Operations on Arrays.							
UNIT - IV	MatPlotLib and Visualization of Data			9 Hrs			
Starting with a Graph, Setting the Axis, Ticks, Grids, Defining the Line Appearance, Using Labels, Annotations, and Legends, Choosing the Right Graph, Creating Advanced Scatterplots, Plotting Time Series, Plotting Geographical Data, Visualizing Graphs.							
UNIT - V	Wrangling Data			10Hrs			
Playing with Scikit-learn, Performing the Hashing Trick, Considering Timing and Performance, Running in Parallel, Counting for Categorical Data, Understanding Correlation, Modifying Data Distributions, Reducing Dimensionality, Clustering, Detecting Outliers in Data.							
Textbooks:							
1. Python for Data Science for Dummies, 2ed, Luca Massaron John Paul Mueller, by ISBN: 978-1-118-84418-2							
Reference Books:							
1. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Pearson; 2 edition (January 26, 2003), ISBN 978-0201648652							
2. Big Data: Principles and best practices of scalable realtime data systems, 1st Edition, Nathan Marz, James Warren, ISBN 978-1617290343							

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Basics of Electrical & Electronics Engineering (common to CSE,CIC ,CSE(DS))		L	T	P	C
20AES0205			3	0	0	3
Pre-requisite	NIL	Semester	II-I			
Course Outcomes (CO):						
CO1: Apply concepts of KVL/KCL in solving DC circuits CO2: Illustrate working principles of induction motor - DC Motor CO3: Identify type of electrical machine based on their operation CO4: Describe operation and characteristics of diodes and transistors. CO5: Make use of diodes and transistors in simple, typical circuit applications. CO6: Understand operation of basic op-amp circuits.						
PART-A (Electrical Engineering)						
UNIT - I	DC & AC Circuits		9Hrs			
Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.						
UNIT - II	DC & AC Machines		9 Hrs			
Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator - principle and operation of DC Motor - Performance Characteristics of DC Motor - Speed control of DC Motor - Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [Elementary treatment only]						
UNIT - III	Basics of Power Systems		9 Hrs			
Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations - Typical AC Power Supply scheme - Elements of Transmission line - Types of Distribution systems: Primary & Secondary distribution systems						
Text Books:						
1. D. P. Kothari and I. J. Nagrath - "Basic Electrical Engineering" - Tata McGraw Hill - 2010. 2. V.K. Mehta & Rohit Mehta, "Principles of Power System" - S.Chand - 2018.						
References:						
1. L. S. Bobrow - "Fundamentals of Electrical Engineering" - Oxford University Press - 2011. 2. E. Hughes - "Electrical and Electronics Technology" - Pearson - 2010. 3. C.L. Wadhwa - "Generation Distribution and Utilization of Electrical Energy", 3rd Edition, New Age International Publications.						
PART-B (Electronics Engineering)						
UNIT - I	Analog Electronics:		9 Hrs			
Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: schottky diode, tunnel diode, varactor diode, photodiode, phototransistor and LED. BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.						
UNIT - II	Digital Electronics:		10Hrs			
Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter.						
UNIT - III	Communication Systems:					
Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Amplitude and Frequency modulation, Pulse modulation, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach).						
Textbooks:						
1. D.P. Kothari, I.J. Nagrath, Basic Electronics, 2 nd edition, McGraw Hill Education(India)Private Limited 2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2 nd edition, Pearson India Private Limited						
Reference Books:						
1. R. Muthu subramanian, S. Salivahanan, "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education, Reprint 2012. 2. David Bell, Electronic Devices and Circuits: Oxford University Press, 5th edition. 2008.						

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	1	2	1								2	
C02	3	2	1	2									1	
C03	3	1	1										1	
C04	3	2	1	2									2	
C05	3	1	1	2	1								2	
C06	3	1											1	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AIITS TPT. CSE (DS)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Database Management Systems Laboratory (Common to CSE, CIC)	L	T	P	C
20APC3203		0	0	3	1.5
Pre-requisite		Semester			II-I

Course Objectives:

- To implement the basic knowledge of SQL queries and relational algebra.
- To construct database models for different database applications.
- To apply normalization techniques for refining of databases.
- To practice various triggers, procedures, and cursors using PL/SQL.
- To design and implementation of a database for an organization

Course Outcomes (CO):

After completion of the course, students will be able to

- CO1:** Write SQL Queries
CO2: Implement PL/SQL programs
CO3: Design database for any real world problem

List of Experiments:

Week-1: CREATION OF TABLES

1. Create a table called Employee with the following structure.

Name	Type
Empno	Number
Ename	Varchar2(20)
Job	Varchar2(20)
Mgr	Number
Sal	Number

- Add a column commission with domain to the Employee table.
- Insert any five records into the table.
- Update the column details of job
- Rename the column of Employ table using alter command.
- Delete the employee whose empno is 19.

2. Create department table with the following structure.

Name	Type
Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

- a. Add column designation to the department table.
- b. Insert values into the table.
- c. List the records of emp table grouped by deptno.
- d. Update the record where deptno is 9.
- e. Delete any column data from the table

3. Create a table called Customer table

Name	Type
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

- a. Insert records into the table.
- b. Add salary column to the table.
- c. Alter the table column domain.
- d. Drop salary column of the customer table.
- e. Delete the rows of customer table whose ust_city is 'hyd'.

4. Create a table called branch table.

Name	Type
Branch name	Varchar2(20)
Branch city	Varchar2(20)
asserts	Number

5. Increase the size of data type for asserts to the branch.
 - a. Add and drop a column to the branch table.
 - b. Insert values to the table.
 - c. Update the branch name column
 - d. Delete any two columns from the table

6. Create a table called sailor table

Name	Type
Sid	Number
Sname	Varchar2(20)
rating	Varchar2(20)

- a. Add column age to the sailor table.
 - b. Insert values into the sailor table.
 - c. Delete the row with rating>8.
 - d. Update the column details of sailor.
 - e. Insert null values into the table.
7. Create a table called reserves table

Name	Type
Boat id	Integer
sid	Integer
day	Integer

- a. Insert values into the reserves table.
- b. Add column time to the reserves table.
- c. Alter the column day data type to date.
- d. Drop the column time in the table.
- e. Delete the row of the table with some condition.

Week-2: QUERIES USING DDL AND DML

1.
 - a. Create a user and grant all permissions to the user.
 - b. Insert the any three records in the employee table and use rollback. Check the result.
 - c. Add primary key constraint and not null constraint to the employee table.
 - d. Insert null values to the employee table and verify the result.
2.
 - a. Create a user and grant all permissions to the user.
 - b. Insert the any three records in the employee table and use rollback. Check the result.
 - c. Add primary key constraint and not null constraint to the employee table.
 - d. Insert null values to the employee table and verify the result.
3.
 - a. Create a user and grant all permissions to the user.
 - b. Insert values in the department table and use commit.
 - c. Add constraints like unique and not null to the department table.
 - d. Insert repeated and null values into the table.
4.
 - a. Create a user and grant all permissions to the user.
 - b. Insert values into the table and use commit.
 - c. Delete any three records in the department table and use rollback.
 - d. Add constraint primary key and foreign key to the table.
5.
 - a. Create a user and grant all permissions to the user.
 - b. Insert records in the sailor table and use commit.
 - c. Add save point after insertion of records and verify save point.
 - d. Add constraints not null and primary key to the sailor table.
 - e. Create a user and grant all permissions to the user.
 - f. Use revoke command to remove user permissions.
 - g. Change password of the user created.
 - h. Add constraint foreign key and not null.
6.
 - a. Create a user and grant all permissions to the user.
 - b. Update the table reserves and use savepoint and rollback.
 - c. Add constraint primary key , foreign key and not null to the reserves table
 - d. Delete constraint not null to the table column

Week-3: QUERIES USING AGGREGATE FUNCTIONS

1.
 - a. By using the group by clause, display the enames who belongs to deptno 10 along with

average salary.

- b. Display lowest paid employee details under each department.
 - c. Display number of employees working in each department and their department number.
 - d. Using built-in functions, display number of employees working in each department and their department name from dept table. Insert deptname to dept table and insert deptname foreach row, do the required thing specified above.
 - e. List all employees which start with either B or C.
 - f. Display only these ename of employees where the maximum salary is greater than or equal to 5000.
2. a. Calculate the average salary for each different job.
 - b. Show the average salary of each job excluding manager.
 - c. Show the average salary for all departments employing more than three people.
 - d. Display employees who earn more than the lowest salary in department 30
 - e. Show that value returned by sign (n)function.
 - f. How many days between day of birth to current date
 3. a. Show that two substring as single string.
 - b. List all employee names, salary and 15% rise in salary.
 - c. Display lowest paid emp details under each manager
 - d. Display the average monthly salary bill for each deptno.
 - e. Show the average salary for all departments employing more than two people.
 - f. By using the group by clause, display the eid who belongs to deptno 05 along with average salary.
 4. a. Count the number of employees in department20
- b. Find the minimum salary earned by clerk.**
- c. Find minimum, maximum, average salary of all employees.
 - d. List the minimum and maximum salaries for each job type.
 - e. List the employee names in descending order.
 - f. List the employee id, names in ascending order by empid.
5. a. Find the sids ,names of sailors who have reserved all boats called'INTERLAKE'
Find the age of youngest sailor who is eligible to vote for each rating level with at least twosuch sailors.
 - b. Find the sname, bid and reservation date for each reservation.
 - c. Find the ages of sailors whose name begin and end with B and has at least 3characters.
 - d. List in alphabetic order all sailors who have reserved redboat.
 - e. Find the age of youngest sailor for each rating level.
 6. a. List the Vendors who have delivered products within 6 months from order date.
 - b. Display the Vendor details who have supplied both Assembled and Subparts.
 - c. Display the Sub parts by grouping the Vendor type (Local or Nonlocal).
 - d. Display the Vendor details in ascending order.
 - e. Display the Sub part which costs more than any of the Assembled parts.
 - f. Display the second maximum cost Assembled part

Week-4: PROGRAMS ON PL/SQL

1. a. Write a PL/SQL program to swap two numbers.
 - b. Write a PL/SQL program to find the largest of three numbers.
2. a. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
 - b. Write a PL/SQL program to find the sum of digits in a given number.
3. a. Write a PL/SQL program to display the number in reverse order.
 - b. Write a PL/SQL program to check whether the given number is prime or not.
4. a. Write a PL/SQL program to find the factorial of a given number.
 - b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius and area.
5. a. Write a PL/SQL program to accept a string and remove the vowels from the string. (When 'hello' passed to the program it should display 'Hll' removing e and o from the world Hello).
 - b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to 10. Else display an error message. Otherwise Display the remainder in words.

Week-5: PROCEDURES AND FUNCTIONS

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a given year.
3. Create a function to find the factorial of a given number and hence find NCR.

4. Write a PL/SQL block to print prime Fibonacci series using local functions.
5. Create a procedure to find the lucky number of a given birth date.
6. Create function to the reverse of given number

Week-6: TRIGGERS

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values:

CUSTOMERS table:

ID	NAME	AGE	ADDRESS	SALARY
1	Alive	24	Khammam	2000
2	Bob	27	Kadappa	3000
3	Catri	25	Guntur	4000
4	Dena	28	Hyderabad	5000
5	Eeshwar	27	Kurnool	6000
6	Farooq	28	Nellore	7000

2. Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database. Passenger(Passport_id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL, Age Integer Not NULL, Sex Char, Address VARCHAR (50) Not NULL);
 - a. Write a Insert Trigger to check the Passport_id is exactly six digits or not.
 - b. Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is updated' when insertion, deletion and updation are done on passenger respectively.
3. Insert row in employee table using Triggers. Every trigger is created with name any trigger have same name must be replaced by new name. These triggers can raised before insert, update or delete rows on data base. The main difference between a trigger and a stored procedure is that the former is attached to a table and is only fired when an INSERT, UPDATE or DELETE occurs.
4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.
5. Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete_emp and also record user who has deleted the record and date and time of delete.
6. Create a transparent audit system for a table CUST_MSTR. The system must keep track of the records that are being deleted or updated

Week-7: PROCEDURES

1. Create the procedure for palindrome of given number.
2. Create the procedure for GCD: Program should load two registers with two Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD is found.
3. Write the PL/SQL programs to create the procedure for factorial of given number.
4. Write the PL/SQL programs to create the procedure to find sum of N natural number.
5. Write the PL/SQL programs to create the procedure to find Fibonacci series.
6. Write the PL/SQL programs to create the procedure to check the given number is perfect or not

Week-8: CURSORS

1. Write a PL/SQL block that will display the name, dept no, salary of first highest paid employees. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the item id is not present in the item master table then the record is inserted in the item master table.
3. Write a PL/SQL block that will display the employee details along with salary using cursors.
4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
5. To write a Cursor to find employee with given job and deptno.
6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the 'employee' table are updated. If none of the employee's salary is updated we get a message 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in 'employee' table

Week-9: CASE STUDY: BOOK PUBLISHING COMPANY

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being

specialists in a particular area, each take sole responsibility for editing one or more publications.

A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with an editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-10: CASE STUDY GENERAL HOSPITAL

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc.). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following.

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-11: CASE STUDY: CAR RENTAL COMPANY

A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, driving license, number about each customer are kept in the database. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-12: CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons.) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre-requisites modules and some degree programs have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for, and their past performance i.e. modules taken and examination results.

For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys wherever required.
5. Insert values into the tables created (Be vigilant about Master- Slave tables).
6. Display the Students who have taken M.Sc course
7. Display the Module code and Number of Modules taught by each Lecturer.
8. Retrieve the Lecturer names who are not Module Leaders.
9. Display the Department name which offers 'English' module.
10. Retrieve the Prerequisite Courses offered by every Department (with Department names).

11. Present the Lecturer ID and Name who teaches 'Mathematics'.
 12. Discover the number of years a Module is aught.
 13. List out all the Faculties who work for 'Statistics' Department.
 14. List out the number of Modules taught by each Module Leader.
 15. List out the number of Modules taught by a particular Lecturer.
 16. Create a view which contains the fields of both Department and Module tables.(Hint- The fields like Module code, title, credit, Department code and its name).
- Update the credits of all the prerequisite courses to 5. Delete the Module 'History' from the Module table.

References:

1. Ramez Elmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.
2. Peter Rob, Carles Coronel, "Database System Concepts", Cengage Learning, 7th Edition, 2008.

Online Learning Resources/Virtual Labs:

<http://www.scoopworld.in> <http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php>

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ATTS TPT. CSE

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Advanced Python Programming for Data Science Lab	L	T	P	C
20APC3204		0	0	3	1.5
Pre-requisite		Semester			II-I
Course Objectives:					
<ul style="list-style-type: none"> Understand the python Programming Language libraries. Exposure on Solving of data science problems. Understand The classification and Regression Model. 					
Course Outcomes (CO):					
After completion of the course, students will be able to CO1: Apply principles and techniques for optimizing the performance of Python numeric Applications CO2: Implement parallel computing applications using Python CO3: Develop GPU accelerated Python applications					
List of Experiments:					
<p>WEEK1:</p> <p>The number of birds banded at a series of sampling sites has been counted by your field crew and entered into the following list. The first item in each sublist is an alphanumeric code for the site and the second value is the number of birds banded. Cut and paste the list into your assignment and then answer the following questions by printing them to the screen.</p> <pre>data = [['A1', 28], ['A2', 32], ['A3', 1], ['A4', 0], ['A5', 10], ['A6', 22], ['A7', 30], ['A8', 19], ['B1', 145], ['B2', 27], ['B3', 36], ['B4', 25], ['B5', 9], ['B6', 38], ['B7', 21], ['B8', 12], ['C1', 122], ['C2', 87], ['C3', 36], ['C4', 3], ['D1', 0], ['D2', 5], ['D3', 55], ['D4', 62], ['D5', 98], ['D6', 32]]</pre> <ol style="list-style-type: none"> 1. How many sites are there? 2. How many birds were counted at the 7th site? 3. How many birds were counted at the last site? 4. What is the total number of birds counted across all sites? 5. What is the average number of birds seen on a site? 6. What is the total number of birds counted on sites with codes beginning with C? (don't just identify this site by eye, in the real world there could be hundreds or thousands of sites) <p>WEEK2:</p> <ol style="list-style-type: none"> 1. Multiplication of two Matrices in Single line using Numpy in Python 2. Transpose a matrix in Single line using Python 3. Python program to print checkerboard pattern of nxn using numpy <p>WEEK3:</p> <p>Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location. Reading Excel data sheet Reading XML dataset</p> <p>WEEK4:</p> <ol style="list-style-type: none"> 1. Find the data distributions using box and scatter plot. 2. Find the outliers using plot. 3. Plot the histogram, bar chart and pie chart on sample data <p>WEEK5:</p> <ol style="list-style-type: none"> 1. Find the correlation matrix. 2. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data. 3. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data. 					

WEEK6:

Import a data from web storage. Name the dataset and now do LogisticRegression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. Require (foreign), require (MASS).

WEEK7:

Decision Tree Classification, attribute selection measures, and how to build and optimize Decision Tree Classifier using Python Scikit-learn.

WEEK8:

Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset.

WEEK9:

Apply regression Model techniques to predict the data

WEEK10:

1. Install relevant package for classification.
2. Choose classifier for classification problem.
3. Evaluate the performance of classifier.

WEEK11:

Clustering algorithms for unsupervised classification.
Plot the cluster data using python with Matplotlib visualizations.

WEEK12:

Case Study: Data Science in Education

Data Science has also changed the way in which students interact with teachers and evaluate their performance. Instructors can use data science to analyse the feedback received from the students and use it to improve their teaching. Use Predictive modeling Data Science that can predict the drop-out rate of students based on their performance and inform the instructors to take necessary precautions.

References:

1. <https://www.w3schools.com/datascience/>
2. <https://data-flair.training/blogs/data-science-tutorials-home/>
3. <https://www.javatpoint.com/data-science>
4. https://www.tutorialspoint.com/python_data_science/index.htm
5. <https://intellipaat.com/blog/tutorial/data-science-tutorial/>

Online Learning Resources/Virtual Labs:

<https://www.vlab.co.in>

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Basics of Electrical & Electronics Engineering Lab (common to CSE,CIC,CSE(DS))		L	T	P	C
20AES0206			0	0	3	1.5
Pre-requisite	NIL	Semester	II-I			
Course Outcomes (CO):						
<p>CO1: Verify Kirchoff's Laws & Superposition theorem for dc supply CO2: Analyze the performance of AC and DC Machines by testing. CO3: Study I – V Characteristics of PV Cell & Perform speed control of dc shunt motor CO4: Ability to operate diodes for finding V-I Characteristics. CO5: Ability to construct and operate rectifiers without & with filters CO6: Ability to construct and operate BJT & FET Characteristics.</p>						
List of Experiments:						
Part A: Electrical Engineering Lab						
<ol style="list-style-type: none"> 1. Verification of Kirchoff laws. 2. Verification of Superposition Theorem. 3. Open circuit characteristics of a DC Shunt Generator. 4. Speed control of DC Shunt Motor. 5. OC & SC test of 1 – Phase Transformer. 6. Brake test on 3 - Phase Induction Motor. 7. Brake test on DC Shunt Motor 						
Part B: Electronics Engineering Lab						
<ol style="list-style-type: none"> 1. PN Junction Diode Characteristics. 2. Zener Diode Characteristics. 3. Rectifiers (With and Without Filter). 4. BJT Characteristics (CB Configuration). 5. BJT Characteristics (CE Configuration). 6. FET Characteristics (CS Configuration). 						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Exploratory Data Analysis with R		L	T	P	C
20ASC3201			0	0	3	1.5
Pre-requisite	NIL	Semester	II-I			
Course Outcomes (CO):						
<p>After completion of the course, students will be able:</p> <p>CO1: To Install and use R for simple programming tasks. CO2: To Extend the functionality of R by using add-on packages. CO3: To Extract data from files and other sources and perform various data manipulation tasks on them. CO4: To Explore statistical functions in R. CO5: To Use R Graphics and Tables to visualize results of various statistical operations on data. CO6: To Apply the knowledge of R gained to data Analytics for real-life applications.</p>						
List of Experiments:						
<p>1: INTRODUCTION TO COMPUTING</p> <p>a. Installation of R b. The basics of R syntax, workspace c. Matrices and lists d. Subsetting e. System-defined functions; the help system f. Errors and warnings; coherence of the workspace</p> <p>2: GETTING USED TO R: DESCRIBING DATA</p> <p>a. Viewing and manipulating Data b. Plotting data c. Reading the data from console, file (.csv) local disk and web d. Working with larger datasets</p> <p>3: SHAPE OF DATA AND DESCRIBING RELATIONSHIPS</p> <p>a. Tables, charts and plots. b. Univariate data, measures of central tendency, frequency distributions, variation, and Shape. c. Multivariate data, relationships between a categorical and a continuous variable, d. Relationship between two continuous variables – covariance, correlation coefficients, comparing multiple correlations. e. Visualization methods – categorical and continuous variables, two categorical variables, two continuous variables.</p> <p>4: PROBABILITY DISTRIBUTIONS</p> <p>a. Sampling from distributions – Binomial distribution, normal distribution b. tTest, zTest, Chi Square test c. Density functions d. Data Visualization using ggplot – Box plot, histograms, scatter plotter, line chart, bar chart, heat maps</p> <p>5: EXPLORATORY DATA ANALYSIS Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.</p> <p>6: TESTING HYPOTHESES</p> <p>a. Null hypothesis significance testing b. Testing the mean of one sample c. Testing two means</p> <p>7: PREDICTING CONTINUOUS VARIABLES</p> <p>a. Linear models b. Simple linear regression c. Multiple regression d. Bias-variance trade-off – cross-validation</p> <p>8: CORRELATION</p> <p>a. How to calculate the correlation between two variables. b. How to make scatter plots. c. Use the scatter plot to investigate the relationship between two variables</p> <p>9: TESTS OF HYPOTHESES</p> <p>a. Perform tests of hypotheses about the mean when the variance is known. b. Compute the p-value. c. Explore the connection between the critical region, the test statistic, and the p-value</p> <p>10: ESTIMATING A LINEAR RELATIONSHIP Demonstration on a Statistical Model for a Linear Relationship</p> <p>a. Least Squares Estimates b. The R Function lm c. Scrutinizing the Residuals</p> <p>11: APPLY-TYPE FUNCTIONS</p> <p>a. Defining user defined classes and operations, Models and methods in R b. Customizing the user's environment c. Conditional statements d. Loops and iterations</p>						

12: STATISTICAL FUNCTIONS IN R

a. Write Demonstrate Statistical functions in R

b. Statistical inference, contingency tables, chi-square goodness of fit, regression, generalized linear models, advanced modeling methods.

References:

1. SandipRakshit, "Statistics with R Programming", McGraw Hill Education, 2018.
2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "AN Introduction to Statistical Learning: with Applications in R", Springer Texts in Statistics, 2017.
3. Joseph Schmuller, "Statistical Analysis with R for Dummies", Wiley, 2017.
4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, "Statistical Programming in R", Oxford Higher Education, 2017.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1					2									
CO2				3	2									
CO3	3			2	2									
CO4	3			2	2									
CO5	3			2	2									
CO6	3			2	2	2								

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Constitution Of India	L	T	P	C
20AMC9902	(common to CSE,CIC,AIDS,AIML,CSE(DS))	3	0	0	0
Pre-requisite	NIL	Semester		II-I	
Course Outcomes (CO):					
Students will be able to:					
CO1: Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.					
CO2: Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.					
CO3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.					
CO4: Discuss the Powers and functions of Governor, President, Judiciary.					
CO5: Discuss the functions of local administration bodies					
UNIT - I		8Hrs			
History of Making of the Indian Constitution - History Drafting Committee, (Composition & Working).					
UNIT - II		9Hrs			
Philosophy of the Indian Constitution - Preamble Salient Features					
UNIT - III		8Hrs			
Contours of Constitutional Rights & Duties - Fundamental Rights - Right to Equality- Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies - Directive Principles of State Policy - Fundamental Duties.					
UNIT - IV		8Hrs			
Organs of Governance - Parliament - Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions					
UNIT - V		9 Hrs			
Local Administration - District's Administration head: Role and Importance - Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation- Pachayati raj: Introduction, PRI: ZillaPachayat - Elected officials and their roles, CEO Zilla Panchayat: Position and role - Block level: Organizational Hierarchy (Different departments) - Village level: Role of Elected and Appointed officials - Importance of grass root democracy.					
Textbooks:					
<ol style="list-style-type: none"> 1. The Constitution of India, 1950 (Bare Act), Government Publication. 2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015. 3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014. 4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015. 					

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)
B.Tech-CSE(DATA SCIENCE)**

Semester IV (Second year) – AK20

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P				
1	PC	20APC3205	Computer Organization	3	0	0	3	30	70	100
2	PC	20APC3206	Design And Analysis Of Algorithms	3	0	0	3	30	70	100
3	PC	20APC3207	Object Oriented Programming through Java	3	0	0	3	30	70	100
4	PC	20APC3208	Operating Systems	3	0	0	3	30	70	100
5	HS	20AHSMB01	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
6	HS	20AHS9905	Universal Human Values	2	1	0	3	30	70	100
7	PC Lab	20APC3209	Design And Analysis Of Algorithms Lab	0	0	3	1.5	30	70	100
8	PC Lab	20APC3210	Object Oriented Programming through Java Lab	0	0	3	1.5	30	70	100
9	PC Lab	20APC3211	Operating Systems Lab	0	0	3	1.5	30	70	100
10	SC	20ASC3202	Digital and Social Media Marketing	1	0	2	2	100	0	100
Total credits							24.5	370	630	1000

Community service Project with credits

(To visit the selected community to conduct survey (Socio-economic & domain survey) and conduct sensitization/awareness program/activities at the end of IV- semester before commencement of V-semester and complete immersion programme also during V-Semester and submit report in V - semester. Assessment will be done at the end of V-Semester).

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Computer Organization (common to CSE,CIC,CSE(DS))			L	T	P	C
20APC3205				3	0	0	3
Pre-requisite	Digital Electronics	Semester		II-II			
Course Objectives:							
<ul style="list-style-type: none"> • To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design • To understand the structure and behavior of various functional modules of a computer. • To learn the techniques that computers use to communicate with I/O devices • To acquire the concept of pipelining and exploitation of processing speed. 							
Course Outcomes (CO):							
After completion of the course, students will be able to							
CO1: Understand computer architecture concepts related to the design of modern processors, memories and I/Os							
CO2: Design Arithmetic and control unit							
CO3: Identify the hardware requirements of Primary and Secondary memory							
CO4: Understand the importance of I/O devices and its interface circuits.							
CO5: Identify pipeline hazards and possible solutions to those hazards							
UNIT - I	Basic Structure of Computer, Machine Instructions and Programs			9 Hrs			
Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.							
Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.							
UNIT - II	Arithmetic, Basic Processing Unit			9Hrs			
Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.							
Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, and Multi programmed Control.							
UNIT - III	The Memory System			9 Hrs			
The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.							
UNIT - IV	Input/Output Organization			9 Hrs			
Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.							
UNIT - V	Pipelining, Large Computer Systems			9 Hrs			
Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.							
Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General- Purpose multiprocessors, Interconnection Networks.							
Textbooks:							
1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.							
Reference Books:							
1. M.Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Education.							
2. Themes and Variations, Alan Clements, "Computer Organization and Architecture", CENGAGE Learning.							
3. SmrutiRanjanSarangi, "Computer Organization and Architecture", McGraw Hill Education.							
4. John P.Hayes, "Computer Architecture and Organization", McGraw Hill Education							
Online Learning Resources:							
https://nptel.ac.in/courses/106/103/106103068/							

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Design And Analysis Of Algorithms (common to CSE,CSE(DS))	L	T	P	C
20APC3206		3	0	0	3
Pre-requisite	NIL	Semester		II-II	
Course Objectives:					
<ul style="list-style-type: none"> To know the importance of the complexity of a given algorithm. To study various algorithm design techniques. To utilize data structures and/or algorithmic design techniques in solving new problems. To know and understand basic computability concepts and the complexity classes P, NP, and NP-Complete. To study some techniques for solving hard problems. 					
Course Outcomes (CO):					
CO1: Analyze the complexity of the algorithms CO2: Use techniques of greedy and dynamic programming to solve the problems. CO3: Implement traversal, backtracking and searching techniques. CO4: choose the appropriate algorithm for solving minimization problem. CO5: Able to prove that a certain problem is NP-Complete					
UNIT - I					9Hrs
Introduction: What is an Algorithm, Algorithm specification, Performance analysis. Divide and Conquer: General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection sort, Stressen's matrix multiplication.					
UNIT - II					9 Hrs
Greedy Method: General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths. Dynamic programming: General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, The traveling sales person problem.					
UNIT - III					9 Hrs
Basic Traversal and Search Techniques: Techniques for binary trees, Techniques for Graphs, Connected components and Spanning trees, Bi-connected components and DFS Back tracking: General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.					
UNIT - IV					8 Hrs
Branch and Bound: The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency Considerations. Lower Bound Theory: Comparison trees, Lower bounds through reductions – Multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.					
UNIT - V					10Hrs
NP – Hard and NP – Complete Problems: NP Hardness, NP Completeness, Consequences of being in P, Cook's Theorem, Reduction Source Problems, Reductions: Reductions for some known problems					
Textbooks:					
<ol style="list-style-type: none"> 1. "Fundamentals of Computer Algorithms", Ellis Horowitz, S. Satraj Sahani and Rajasekhran, 2nd edition, University Press.2014, 2. "Design and Analysis of Algorithms", Parag Himanshu Dave, Himanshu Bhalchandra Dave, Pearson Education, Second Edition, 2009. 					
Reference Books:					
<ol style="list-style-type: none"> 1. "Introduction to Algorithms", second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd./ Pearson Education. 2. "Introduction to Design and Analysis of Algorithms A strategic approach", R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill. 3. "Design and Analysis of algorithms", Aho, Ullman and Hopcroft, Pearson education. 					
Online Learning Resources:					
nptel videos					

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Object Oriented Programming through Java (common to CSE,CIC,CSE(DS))	L	T	P	C
20APC3207		3	0	0	3
Pre-requisite	NIL	Semester		II-II	
Course Objectives:					
At the end of the course, the students will be able to: <ul style="list-style-type: none"> To understand object oriented programming concepts, and apply them in solving Problems. To introduce the principles of inheritance and polymorphism and implementation of packages and interfaces. To learn java's exception handling mechanism, String Handling Methods. To introduce the concepts of multithreading and Collection Framework and internet programming using applets. To introduce the design of Graphical User Interface swing controls. 					
Course Outcomes (CO):					
CO1: Understanding the Syntax, Semantics and features of Java Programming Language. CO2: To gain knowledge on Object Oriented Programming concepts. CO3: Raise Exceptions and handle exceptions. CO4: Analyze the method of creating Multi-threading programs CO5: Ability to create GUI applications & perform event handling.					
UNIT - I		9Hrs			
Object Oriented Thinking: History of Java, Java Buzzwords, Overview of OOP CLASSES AND Objects: Classes, Objects, Simple Java Program, Methods, Constructors, this Keyword, Garbage Collection, Data Types, Variables, Arrays, Operators, Control Statements Overloading of Methods and Constructors, Parameter Passing, Recursion, String Class and String handling methods.					
UNIT - II		9 Hrs			
Inheritance: Inheritance Basics, Using Super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Using final with Inheritance, Object Class. Packages: Packages, Access Protection, Importing Packages. Interfaces: Defining an Interface, Implementing Interface, Applying Interface, Variables in Interfaces, Interfaces can be extended.					
UNIT - III		8Hrs			
Exception Handling: Exception Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built in Exceptions, Creating Own Exception Sub Classes. Input and Output Operations: I/O basics, reading console input, writing console output, the PrintWriter class, reading and writing files, automatically closing a file. Generic Programming : Generic classes, generic methods, Bounded Types, Restrictions and Limitations.					
UNIT - IV		8 Hrs			
Multithreading: Java Thread Model, The Main Thread, Thread Life Cycle, Creating Thread and Multiple Threads, isAlive() and join(), Thread Priorities, Synchronization, Inter thread Communication, Suspending, Resuming and Stopping Threads. Collection Framework: Collection Overview, Collection Interfaces: The Collection Interface, the List Interface, the Queue Interface, Collection Classes: Array List Class, Linked List Class, String Tokenizer, Scanner.					
UNIT - V		10Hrs			
Applets: Applet Basics, Life Cycle of an Applet, Simple Applet Display Methods, The HTML APPLET tag, Passing Parameters to Applets. Swing: Introduction to Swing Model-View, Controller design pattern button, layout management, Swing Components.					
Textbooks:					
Herbert Schildt, Java. The complete reference, TMH. 9thEdition, 2014 Cay. S. Horstmann and Gary Cornell Core Java 2, Vol 2, Advanced Features, Pearson Education, 7thEdition, 2004					
Reference Books:					
<ol style="list-style-type: none"> J.Nino and F.A. Hosch, An Introduction to programming and OO design using Java, John Wiley & sons. Y. Daniel Liang, Introduction to Java programming, Pearson Education 6th Edition R.A. Johnson- Thomson, An introduction to Java programming and object oriented application development. P. Radha Krishna, Object Oriented Programming through Java, University Press. 					
Online Learning Resources:					
www.javatpoint.com					

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AIITS TPT. CSE (DS)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Operating Systems (common to CSE,CIC,AIDS,AIML,CSE(DS))		L	T	P	C
20APC3208			3	0	0	3
Pre-requisite	Basics of CO and DBMS	Semester	II-II			
Course Objectives:						
<p>The course is designed to</p> <ul style="list-style-type: none"> • Understand basic concepts and functions of operating systems • Understand the processes, threads and scheduling algorithms. • Provide good insight on various memory management techniques • Expose the students with different techniques of handling deadlocks • Explore the concept of file-system and its implementation issues • Familiarize with the basics of the Linux operating system • Implement various schemes for achieving system protection and security 						
Course Outcomes (CO):						
<p>After completion of the course, students will be able to</p> <p>CO1: Distinguish between the different types of operating system environments. CO2: Apply the concepts of process synchronization & CPU scheduling CO3: Develop solutions to deadlock and memory management CO4: Analyze various disk scheduling algorithms and file system interfaces CO5: Analyze the various security issues and goals of protection</p>						
UNIT - I						9 Hrs
<p>Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Computing Environments, Open- Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot. Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.</p>						
UNIT - II						10Hrs
<p>Threads: overview, Multi-core Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues. Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches. CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.</p>						
UNIT - III						8Hrs
<p>Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table. Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.</p>						
UNIT - IV						9Hrs
<p>Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation. File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection. File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.</p>						
UNIT - V						8Hrs
<p>I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations. Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language - Based Protection Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer-security classifications.</p>						
Textbooks:						
1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley, Eight Edition, 2018						
Reference Books:						
1. Operating systems by A K Sharma, Universities Press,						

2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Operating Systems, A.S.Godbole, Second Edition, TMH.
4. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
5. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
6. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.
7. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
8. Operating System Desgin, Douglas Comer, CRC Press, 2nd Edition.
9. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.

Online Learning Resources:

<https://nptel.ac.in/courses/106/106/106106144/> <http://peterindia.net/OperatingSystems.html>

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS TPT. CSE

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Managerial Economics And Financial Analysis (common to CSE,CIC,AIDS,AIML,CSE(DS))		L	T	P	C
20AHSMB01			3	0	0	3
Pre-requisite	NIL	Semester	II-II			
Course Outcomes (CO):						
After completion of this course, the student will able,						
CO1: Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.						
CO2: Apply the Concept of Production cost and revenues for effective Business decision						
CO3: Analyze how to invest their capital and maximize returns.						
CO4: Evaluate the capital budgeting techniques.						
CO5: Define the concepts related to financial accounting and management and able to develop the Accounting statements and evaluate the financial performance of business entity.						
UNIT - I	Managerial Economics		8Hrs			
Introduction – meaning, nature, significance, functions, and advantages, ME and its role in other fields. Demand - Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing forecasting, Methods.						
UNIT - II	Production and Cost Analysis		10Hrs			
Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and Long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) – Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.						
UNIT - III	Business Organizations and Markets		8Hrs			
Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies.						
UNIT - IV	Capital Budgeting		9Hrs			
Introduction to Capital, Sources of Capital. Short-term and Long-term Capital : Working capital, types, Estimating Working capital requirements. Capital Budgeting – Features, Proposals, Time value of money. Methods and Evaluation of Projects – Pay Back Method, Accounting Rate of Return (ARR), Net Present Value (NPV), and Internal Rate Return (IRR) Method (simple problems).						
UNIT - V	Financial Accounting and Analysis		8Hrs			
Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.						
Textbooks:						
1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013. 2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019						
Reference Books:						
1. Ahuja HI Managerial economics Schand,3/e,2013 2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013. 3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi. 4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.						
Online Learning Resources:						
https://www.slideshare.net/123ps/managerial-economics-ppt https://www.slideshare.net/rossanz/production-and-cost-45827016 https://www.slideshare.net/darkyla/business-organizations-19917607 https://www.slideshare.net/balarajbl/market-and-classification-of-market https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396 https://www.slideshare.net/ashu1983/financial-accounting .						

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AIITS TPT. CSE (DS)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Universal Human Values (common to CSE,CIC,AIDS,AIML,CSE(DS))		L	T	P	C
20AHS9905			2	1	0	3
Pre-requisite	NIL	Semester	II-II			
Course Objectives :						
<ul style="list-style-type: none"> • Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. • Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence • Strengthening of self-reflection. • Development of commitment and courage to act. 						
Course Outcomes (CO):						
On completion of this course, the students will be able to						
CO1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature)						
CO2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.						
CO3: They would have better critical ability.						
CO4: They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).						
CO5: 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.						
UNIT - I	Course Introduction - Need, Basic Guidelines, Content and Process for Value Education		8Hrs			
<ul style="list-style-type: none"> • Purpose and motivation for the course, recapitulation from Universal Human Values-I • Self-Exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration • Continuous Happiness and Prosperity- A look at basic Human Aspirations • Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority • Understanding Happiness and Prosperity correctly- A critical appraisal of the current. scenario • Method to fulfill the above human aspirations: understanding and living in harmony at various levels. <p>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.</p>						
UNIT - II	Understanding Harmony in the Human Being - Harmony in Myself		10Hrs			
<ul style="list-style-type: none"> • Understanding human being as a co-existence of the sentient 'I' and the material 'Body' • Understanding the needs of Self ('I') and 'Body' - happiness and physical facility • Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) • Understanding the characteristics and activities of 'I' and harmony in 'I' • Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail • Programs to ensure Sanyam and Health. <p>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.</p>						
UNIT -III	Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship.		8Hrs			
<ul style="list-style-type: none"> • Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship • Understanding the meaning of Trust; Difference between intention and competence • Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship • Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals • Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family <p>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</p>						

UNIT –IV	Understanding Harmony in the Nature and Existence - Whole existence as Coexistence	9Hrs
<ul style="list-style-type: none"> Understanding the harmony in the Nature Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature Understanding Existence as Co-existence of mutually interacting units in all- pervasive space 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. <p>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.</p>		
UNIT – V	Implications of the above Holistic Understanding of Harmony on Professional Ethics.	8Hrs
<ul style="list-style-type: none"> Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order 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. Case studies of typical holistic technologies, management models and production systems 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 Sum up. <p>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.</p>		
Textbooks:		
<ol style="list-style-type: none"> R R Gaur, R Asthana, G P Bagaria, “A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-47-1 R R Gaur, R Asthana, G P Bagaria, “Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2 		
Reference Books:		
<ol style="list-style-type: none"> Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999. A. N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004. The Story of Stuff (Book). Mohandas Karamchand Gandhi “The Story of My Experiments with Truth” E. F.Schumacher. “Small is Beautiful” Slow is Beautiful –Cecile Andrews J C Kumarappa “Economy of Permanence” Pandit Sunderlal “Bharat Mein Angreji Raj” Dharampal, “Rediscovering India” Mohandas K. Gandhi, “Hind Swaraj or Indian Home Rule” India Wins Freedom - Maulana Abdul Kalam Azad Vivekananda - Romain Rolland(English) Romain Rolland (English) 		

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Design And Analysis of Algorithms Lab	L	T	P	C
20APC3209		0	0	3	1.5
Pre-requisite	NIL	Semester		II-II	
Course Objectives:					
<ul style="list-style-type: none"> To know the importance of the complexity of a given algorithm. To study various algorithm design techniques. To utilize data structures and/or algorithmic design techniques in solving new problems. To know and understand basic computability concepts and the complexity classes P, NP, and NP-Complete. To study some techniques for solving hard problems. 					
Course Outcomes (CO):					
<p>CO1: Develop programs for sorting a given set of elements and analyse its time complexity. CO2: Solve and analyse the problems using greedy methods. CO3: Solve and analyse the problems using dynamic programming. CO4: Apply backtracking method to solve various problems. CO5: Apply branch and bound method to solve 0/1 knapsack problem.</p>					
List of Experiments:					
<ol style="list-style-type: none"> 1. Implement Selection sort and find how many steps are required to sort 10 elements. 2. Implement and Analysis factorial of a number program using iterative and recursive methods. 3. Sort a given set of elements using the quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n (the number of elements in the list to be sorted) and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. 4. Write a program to check whether a given graph is connected or not using the DFS method. 5. Apply Greedy method to compress the given data using Huffman encoding. 6. Implement fractional knapsack problem using Greedy Strategy. 7. Implement minimum spanning tree using Prim's algorithm and analyse its time complexity. 8. Apply dynamic programming methodology to implement 0/1 Knapsack problem. 9. Solve the longest common subsequence problem using dynamic programming. 10. Find the length of the longest subsequence in a given array of integers such that all elements of the subsequence are sorted in strictly ascending order. 11. Implement N-Queens problem using backtracking. 12. Implement graph coloring problem using backtracking. 13. Find the solution of the 0/1 Knapsack Problem using LC Branch and Bound. 14. Find the solution to the Travelling Salesman Problem. Repeat the experiment for a graph having total number of nodes (n) = 4, 8, 12, 16, 20 and note the time required to find the solution. Plot the graph taking n on the x-axis and time on y-axis and analyze the graph to determine whether it is exponential or not. 					
References:					
<ol style="list-style-type: none"> 1. https://onlinecourses.nptel.ac.in/noc19_cs47/preview 2. https://ocw.mit.edu/courses/6-046j-design-and-analysis-of-algorithms-spring-2015/ 3. https://vignanits.ac.in/design-and-analysis-of-algorithms-lab/ 4. https://www.ahirlabs.com/practicals/design-analysis-of-algorithms-lab-practical/ 					
Online Learning Resources/Virtual Labs:					
http://www.javatpoint.com					

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Object Oriented Programming through Java Lab (common to CSE,CIC,CSE(DS))		L	T	P	C
20APC3210			0	0	3	1.5
Pre-requisite	NIL	Semester	II-II			
Course Objectives:						
<ul style="list-style-type: none"> • To experiment with the syntax and semantics of java language and gain experience with java programming • Learn to use object orientation to solve problems and use java language to implement them. 						
Course Outcomes (CO):						
<p>CO1: Demonstrate java compiler and eclipse platform and learn how to use net beans IDE to create java application</p> <p>CO2: Ability to create user friendly interfaces</p> <p>CO3: Ability to solve the problem using object oriented approach and design solutions which are robust</p> <p>CO4: Implement exception handling and Templates</p> <p>CO5: Ability to create GUI components and implementations</p>						
List of Experiments:						
<p>Week-1: (Unit-1) Installation of Java software, study of any integrated development environment, Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class and run it. Practice Java Basic Programs on Classes and Objects.</p> <p>Week-2: (Unit-1) Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Commute the bill amount using the following tariff. If the type of the EB connection is domestic, calculate the amount to be paid as follows: First 100 units - Rs. 1 per unit; 101-200 units - Rs. 2.50 per unit; 201 -500 units - Rs. 4 per unit; 501 units - Rs. 6 per unit. If the type of the EB connection is commercial, calculate the amount to be paid as follows: First 100 units - Rs. 2 per unit; 101-200 units - Rs. 4.50 per unit; 201 -500 units - Rs. 6 per unit; > 501 units - Rs. 7 per unit. Write a java program to illustrate the concept of class with method overloading. C) Write a java program to illustrate the concept of class with Constructors overloading.</p> <p>Week-3:(Unit-2) a) Write a program to create a class named shape. It should contain 2 methods, draw() and erase() that prints "Drawing Shape" and "Erasing Shape" respectively. For this class, create three sub classes, Circle, Triangle and Square and each class should override the parent class functions - draw () and erase (). The draw() method should print "Drawing Circle", "Drawing Triangle" and "Drawing Square" respectively. The erase() method should print "Erasing Circle", "Erasing Triangle" and "Erasing Square" respectively. Create objects of Circle, Triangle and Square in the following way and observe the polymorphic nature of the class by calling draw() and erase() method using each object. Shape c=new Circle(); Shape t=new Triangle(); Shape s=new Square(); b) Write a Java Program to demonstrate inheritance & usage of super</p> <p>Week-4:(Unit-2) Write a Java Program to implement multilevel inheritance. Write a Java program to implement the method overriding Write a Java program to implement dynamic method dispatch.</p> <p>Week-5:(Unit-2) Write a Java program to implement abstract class. Write a Java Program to implement Packages. Write a Java Program to implement Access Protection in Packages.</p> <p>Week-6:(Unit-2) Write a Java program to demonstrate interfaces. Write a Java program to implement the multiple inheritance using interfaces.</p> <p>Week-7:(Unit-3) Write a Java program to implement the exception handling mechanism. Write a Java program to implement the nested try statement. Write a Java program to implement your own exception class.</p> <p>Week-8:(Unit-3) Write a Java Program to demonstrate the following String Handlings. String Length& Concatenation. Character Extraction. String Comparison. Searching and modifying String. Write a Java Program to demonstrate String Buffer Class.</p> <p>Week-9:(Unit-4) Write a Java program for multi-thread implementation. Write a Java program to implement producer consumer problem using inter-thread communication mechanism.</p> <p>Week-10:(Unit-4)</p>						

Practice any two Programs on Collections.
Practice any two Programs on String Tokenizer & Scanner.

Week-11:(Unit-5)

Write a Java Program to develop an applet that displays a simple message.

Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named –Compute! is clicked.

Write a java program to handle keyboard events.

Write a java program to handle Mouse events

Week-12:(Unit-5)

Write a Java Program to demonstrate AWT Label & Button.

Write a Java Program to demonstrate JLabel, JTextField & JButton.

Write a program to design a calculator using event driven programming paradigm of java

References:

5. Herbert Schildt,Java. The complete reference, TMH. 9thEdition.
6. H.M.Dietel and P.J.Dietel, Java How to Program 6thEdition,PearsonEducation/PHI
7. Y.Daniel Liang, Introduction to Java programming, Pearson Education, 6thEdition.
8. Cay Horstmann, Big Java, 2ndedition, Wiley Student Edition, Wiley India Private Limited.

Online Learning Resources/Virtual Labs:

<http://www.javatpoint.com>

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	Operating Systems Lab	L	T	P	C
20APC3211	(common to CSE,CIC,AIDS,AIIML,CSE(DS))	0	0	3	1.5
Pre-requisite	Basics of CO	Semester			II-II

Course Objectives:

- To understand the design aspects of operating system
- To solve various synchronization problems

Course Outcomes (CO):

- CO1:** Ensure the development of applied skills in operating systems related areas.
CO2: Able to write software routines modules or implementing various concepts of operating system.

List of Experiments to be implemented in C/Java

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls Fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms: a) Round Robin b) SJF c) FCFS d) Priority
5. Simulate all file allocation strategies: a) Sequential b) Indexed c) Linked
6. Simulate MVT and MFT
7. Simulate all File Organization Techniques a) Single level directory b) Two level c) Hierarchical d) DAG
8. Simulate Bankers Algorithm for Deadlock Avoidance
9. Simulate Bankers Algorithm for Deadlock Prevention
10. Simulate all page replacement algorithms a) FIFO b) LRU c) LFU Etc. ...
11. Simulate Paging Technique of memory management
12. Control the number of ports opened by the operating system with a) Semaphore b) monitors
13. Simulate how parent and child processes use shared memory and address space
14. Simulate sleeping barber problem
15. Simulate dining philosopher's problem
16. Simulate producer and consumer problem using threads (use java)
17. Simulate little's formula to predict next burst time of a process for SJF scheduling algorithm.
18. Develop a code to detect a cycle in wait-for graph
19. Develop a code to convert virtual address to physical address
20. Simulate how operating system allocates frame to process
21. Simulate the prediction of deadlock in operating system when all the processes announce their resource requirement in advance.

References:

1. "Operating System Concepts", Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth Edition, John Wiley.
2. "Operating Systems: Internals and Design Principles", Stallings, Sixth Edition-2009, Pearson Education
3. "Modern Operating Systems", Andrew S Tanenbaum, Second Edition, PHI.
4. "Operating Systems", S.Haldar, A.A.Aravind, Pearson Education.
5. "Principles of Operating Systems", B.L.Stuart, Cengage learning, India Edition.2013-2014
6. "Operating Systems", A.S.Godbole, Second Edition, TMH.
7. "An Introduction to Operating Systems", P.C.P. Bhatt, PHI.

Online Learning Resources/Virtual Labs:

<https://www.cse.iitb.ac.in/~mythili/os/>
<http://peterindia.net/OperatingSystems.html>

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Course Code	DIGITAL AND SOCIAL MEDIA MARKETING		L	T	P	C
20ASC3202			0	0	3	1.5
Pre-requisite	Internet Knowledge, Acquittance with some social media Facebook, Twitter	Semester	II-II			
Course Objectives:						
<ul style="list-style-type: none"> This course takes an in-depth look at the relationship between media and human behavior, and examines how organizations capitalize on social media, and these consumer-to-consumer interactions, to support their marketing efforts. 						
Course Outcomes (CO):						
<p>CO1: Understand what social media is, the various channels through which it operates, and its role in marketing strategy.</p> <p>CO2: Use principles of consumer and social psychology to develop social media content and campaigns that engage consumers.</p> <p>CO3: Draw on knowledge about word-of-mouth marketing to develop effective approaches for propagating ideas, messages, products, and behaviors across social networks</p> <p>CO4: Use Email marketing activities.</p> <p>CO5: Measure the impact of a social media campaign in terms of a specific marketing objective</p>						
UNIT I	Introduction, Search Engine optimization		9Hrs			
<p>Marketing Goes Digital: Introduction, Digital isn't the only option, Non-Marketing digital marketers, Personalization, Viral Marketing, Paid, earned and owned, Content marketing, Influencers, Affiliate marketing, Attribution, Public relations and reputation management, Integrated marketing communications, Gaming, Legal Considerations, Strategic digital marketing, Digital marketing Objectives</p> <p>Search Engine optimization: Introduction, How search engines work, Keyword selection, On-site optimization, Off-site optimization, Strategic search engine optimization, Third-party search engine ranking</p> <p>Activity 1:(Search Engine Optimization) Perform the following activities in relation to On Page -Search Engine Optimization.</p> <ol style="list-style-type: none"> Submit your site to Google Search Console: Take a screenshot of successful message. Create XML Map. Submit to Google Search Console: Take a screenshot of successful message. Install Yoast SEO Plug-in. Perform SEO Analysis. Take screenshot of the report Perform Readability Analysis of the post that you created in Activity 1 Website Review: Part:1. Question 1 using Yoast SEO. Take a screenshot of the report Use keyword Planner tool. Select 10 Important Keyword for your website. Takescreen shot of this list. 						
UNIT II	Website Development		8Hrs			
<p>Website Development: Introduction, Web presence ownership, management and development, Usability, The basics, Content development, The B2B website, The global web presence.</p> <p>Activity 2: Buy Domain Name and WebHosting You need to buy a domain name and webhosting to build your own websites which is very important. to have hands-on experience with SEO and other digital marketing techniques.</p>						
UNIT III	E-commerce		9Hr			
<p>E-commerce: Introduction, Multi-channel retailing, Fulfilment, Comparison shopping engines, emarketplaces and third-party shopping websites, The e-commerce website</p> <p>Advertising online: Introduction, Programmatic advertising, Objectives and management, Online ad formats, Search advertising, Network advertising, Landing pages.</p> <p>Activity-3: (Website Review)</p> <ol style="list-style-type: none"> Crete a Website of your own Add a new post to your website, a topic should be related to your Website. Add a contact us form in the website (Use Contact Form 7 Plug-in). Create Home page of your Website using Elementor Plug-in. Add Slider to any page of your website Create top Menu of your website 						
UNIT IV	Email marketing		8Hr			
<p>Email marketing: Introduction, Email as a medium for direct marketing, Email as a medium for marketing messages, Email newsletters</p> <p>Activity 4: Email Marketing All these questions are with respect to MailChimp</p> <ol style="list-style-type: none"> Create a new Audience. Add 10 Dummy Subscribers to the audience list using any of the following methods <ol style="list-style-type: none"> Manual Copy Paste from the file CSV or tab-delimited text file Make sure your list includes, First Name, Last name, Phone (Dummy), Tag, Address and Gender. Please also mention which method you have used. Take a screenshot of the list. Upload to your website. Send the URL of Page. 						

3. Create a signup form using “Form Builder Option”. Objective should be collecting the emails for your Digital Marketing Training Institute. Share the URL of Signup form
4. Create an embedded form. Embed this form in any page of your website. Share the link of the page. Objective should be collecting the emails only.
5. Suppose you are offering Training on Digital Marketing. Create a 1 Column – Full Width Template by using at least five Blocks in the template. Share the URL of that template
6. Select “Art Newsletter” and customize it a newsletter from digital marketing training institute. You may include the text/ message as per your wish.

Activity 5: Email Marketing

All these questions are with respect to Mail Chimp

1. Take the audience list. Create Two segments based on gender. Take the screenshot of each segment and Upload to your website. Send the URL of Page.
2. Create a group based on interest in your audience. It should be visible in Signup form. Take the screenshot and Upload to your website. Send the URL of Page.
3. Create a dummy campaign using mail chimp to promote Digital marketing services. Share the URLs of the Campaign. Use may use any template as per your wish.
4. Create a dummy ‘plain text campaign’ on any subject. Take a screenshot of Desktop and Mobile preview. Upload to your website. Send the URL of Page.
5. Create a pop-up form for your website. Share the URL of your website

UNIT V	Marketing on Social media	9Hr
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Marketing on social media: Introduction, Blogging, Consumer reviews and ratings, Social networking, Social sharing, Social media service and support, Strategic marketing on social media, Measure and monitor.

Activity 6: Social Media Marketing

Assume a product. You want to advertise it. Prepare the advertisement and do the marketing on Facebook.

Activity 7: Twitter and LinkedIn

Experiment with Twitter and LinkedIn

Activity 8: YouTube

All the students put together create a YouTube Chanel. Upload videos. Optimize it.

Activity 9: Logo, Banner, Video

Prepare logo, banner, and Video for assumed product/organization.

Activity 10: WhatsApp

Prepare a publicity video and market it on WhatsApp

Textbooks:

1. Alan Charlesworth, “Digital Marketing: A Practical Approach”, 3rd Edition, 2018

References:

1. Digital and Social Media Marketing: Emerging Applications and Theoretical Development, Nripendra P. Rana 2019
2. Digital Marketing Paperback – 6 August 2020 by Seema Gupta

Online Learning Resources/Virtual Labs:

Advanced Certificate in Digital Marketing and Communicatio MICA, upGrad

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)