COURSE STRUCTURE

I SEMESTER

S.No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17FE01	Professional Communication-I	3	-	-	3	3	40	60	100
2	17FE05	Differential Equations and Numerical Applications	3	2	-	5	4	40	60	100
3	17FE15	Engineering Chemistry	4	-	-	4	4	40	60	100
4	17CI01	Computer Programming	2	2	-	4	3	40	60	100
5	17EC02	Electronic Devices and Circuits	2	2	-	4	3	40	60	100
6	17FE65	Engineering Chemistry Lab	-	-	2	2	1	40	60	100
7	17CI60	Computer Programming Lab	-	-	2	2	1	40	60	100
8	17EC61	Electronic Devices and Circuits Lab	-	-	2	2	1	40	60	100
9	17CI61	IT Workshop	1	-	2	3	2	40	60	100
		Total	**15**	**6**	**8**	**29**	**22**	**360**	**540**	**900**

II SEMESTER

S.No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17FE02	Professional Communication-II	3	-	-	3	3	40	60	100
2	17FE06	Transformation Techniques and Vector Calculus	3	2	-	5	4	40	60	100
3	17FE12	Applied Physics	3	2	-	5	4	40	60	100
4	17EE52	Basic Electrical Engineering	2	2	-	4	3	40	60	100
5	17CI02	Digital Logic Design	2	2	-	4	3	40	60	100
6	17FE62	Applied Physics Lab	-	-	2	2	1	40	60	100
7	17FE60	English Communication Skills Lab	-	-	2	2	1	40	60	100
8	17CS60	Digital Logic Design Lab	-	-	2	2	1	40	60	100
9	17ME75	Computer Aided Engineering Drawing Lab	1	-	2	3	2	40	60	100
		Total	**14**	**8**	**8**	**30**	**22**	**360**	**540**	**900**

III SEMESTER

S.No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17FE08	Probability and Statistics	3	2	-	5	4	40	60	100
2	17FE03	Environmental Science	3	-	-	3	3	40	60	100
3	17CI03	Discrete Mathematical Structures	2	2	-	4	3	40	60	100
4	17CI04	Python Programming	2	2	-	4	3	40	60	100
5	17CI05	Data Structures	2	2	-	4	3	40	60	100
6	17CI06	Computer Architecture	2	2	-	4	3	40	60	100
7	17FE66	Statistical Programming with R Lab	-	-	2	2	1	40	60	100
8	17CI62	Python Programming Lab	-	-	2	2	1	40	60	100
9	17CI63	Data Structures Lab	-	-	2	2	1	40	60	100
10	17PD01	Problem Assisted Learning	-	-	1	1	0	100	-	100
		Total	**14**	**10**	**7**	**31**	**22**	**460**	**540**	**1000**

IV SEMESTER

S.No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17FE11	Linear Algebra and Numerical Applications	3	2	-	5	4	40	60	100
2	17CI07	OOPs Through Java	3	-	-	3	3	40	60	100
3	17CI08	Design and Analysis of Algorithms	3	-	-	3	3	40	60	100
4	17CS01	Linux Programming	3	-	-	3	3	40	60	100
5	17CI09	Data Base Management Systems	2	2	-	4	3	40	60	100
6	17CI10	Software Engineering	3	-	-	3	3	40	60	100
7	17CI64	Database Management Systems Lab	-	-	2	2	1	40	60	100
8	17CS61	Linux Programming Lab	-	-	2	2	1	40	60	100
9	17CI65	OOPs through Java Lab	-	-	2	2	1	40	60	100
10	17PD03	Professional Ethics and Human Values	3	-	-	3	0	40	60	100
11	17PD02	Problem Based Learning	-	-	1	1	0	100	-	100
		Total	**20**	**4**	**7**	**31**	**22**	**500**	**600**	**1100**

V SEMESTER

S.No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17HS01	Engineering EconomicsandAccountancy	3	-	-	3	3	40	60	100
2	**PROGRAM ELECTIVE – I**		3	-	-	3	3	40	60	100
	17CI11	Computer Graphics								
	17CS02	Principles of Programming Languages								
	17CI12	Human Computer Interaction								
	17CI13	Advanced Database Management Systems								
3	17CS03	UML and Design Patterns	3	-	-	3	3	40	60	100
4	17CI14	Web Technologies	3	-	-	3	3	40	60	100
5	17CI15	Automata Theory and Compiler Design	3	-	-	3	3	40	60	100
6	17CS04	Operating Systems	3	-	-	3	3	40	60	100
7	17CS62	UML and Design Patterns lab	-	-	2	2	1	40	60	100
8	17CI66	Web Technologies Lab	-	-	2	2	1	40	60	100
9	17PD04	Mini Project	-	-	4	4	2	100	-	100
10	17PD05	Employability Enhancement Skills-I	1	-	-	1	0	100	-	100
11	17CS90	Advanced Graph Algorithms **(*Add on course – I)**	3	-	-	3	3	40	60	100
12	17PD06	Industrial Training/In-house Training	-	-	-	-	-	-	-	-
		Total	**22**	**-**	**8**	**30**	**22/25***	**560**	**540**	**1100**

VI SEMESTER

S.No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17CS05	Android Technologies	2	2	-	4	3	40	60	100
2	17CI16	Data Mining and Data Warehousing	2	2	-	4	3	40	60	100
3	17EC22	Microprocessors and Microcontrollers	3	-	-	3	3	40	60	100
4	17CI17	Data Communications and Computer Networks	3	-	-	3	3	40	60	100
5	**PROGRAM ELECTIVE – II**		3	-	-	3	3	40	60	100
	17CS06	Swift Programming								
	17CS07	Scala Programming								
	17CS08	PHP Programming								
	17CS09	Google Go Programming								
6	**OPEN ELECTIVE – I**		3			3	3	40	60	100
7	17CS63	Android Technologies Lab	-	-	2	2	1	40	60	100
8	17CI67	Data Mining and Data Warehousing Lab	-	-	2	2	1	40	60	100
9	17FE61	Presentation Skills Lab	-	-	2	2	1	40	60	100
10	17PD07	Seminar	-	-	2	2	1	100	-	100
11	17PD08	Employability Enhancement Skills – II	1	-	-	1	0	100	-	100
12	17CS91	Software Testing Methodologies **(*Addoncourse – II)**	3	-	-	3	3	40	60	100
		Total	**20**	**4**	**8**	**32**	**22/25***	**600**	**600**	**1200**

VII SEMESTER

S.No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	17CI18	Big Data Analytics	2	2	-	4	3	40	60	100
2	17CI19	Internet of Things	2	2	-	4	3	40	60	100
3	17CI20	Information Security	2	2	-	4	3	40	60	100
4	**PROGRAM ELECTIVE – III**		3	-	-	3	3	40	60	100
	17CI21	Software Project Management								
	17CI22	TCP/IP Networking								
	17CI23	Artificial Intelligence								
	17CI24	Image Processing								
5	**PROGRAM ELECTIVE – IV**		3	-	-	3	3	40	60	100
	17CS10	Service Oriented Architecture								
	17CI31	Ad-Hoc Networks								
	17CI25	Neural Networks and Fuzzy Logic								
	17CI26	Pattern Recognition								
6	**OPEN ELECTIVE – II**		3	-	-	3	3	40	60	100
7	17CI68	Big Data with HADOOP Lab	-	-	2	2	1	40	60	100
8	17CI69	Internet of Things Lab	-	-	2	2	1	40	60	100
9	17PD09	Internship	-	-	1	1	2	100		100
10	17PD10	Extra-curricular/Co-curricular Activities	-	-	1	1	-	-	-	-
11	17CS92	Information Retrieval Systems**(*Add on course – III)**	3	-	-	3	3	40	60	100
		Total	**18**	**6**	**6**	**30**	**22/25***	**460**	**540**	**1000**

VIII SEMESTER

S.No	Course code	Course Title	Contact hours/week				Credits	Scheme of Valuation		
			L	T	P	Total		CIE	SEE	Total
1	**PROGRAM ELECTIVE - V**		3	-	-	3	3	40	60	100
	17CI27	Software Requirements Engineering								
	17CS11	Storage Area Networks								
	17CI28	Machine Learning								
	17CS12	Color Image Processing								
2	**PROGRAM ELECTIVE - VI**		3	-	-	3	3	40	60	100
	17CS13	Software Security Engineering								
	17CI29	Cloud Computing								
	17CI30	Natural Language Processing								
	17CS14	Virtual Reality								
3	**OPEN ELECTIVE - III**		3	-	-	3	3	40	60	100
4	17PD11	Project Work	-	-	24	24	12	40	60	100
5	17PD12	Comprehensive Viva-Voce	-	-	2	2	1	100	-	100
		Total	**9**	**-**	**26**	**35**	**22**	**260**	**240**	**500**

OPEN ELECTIVE – I (VI Semester)

S.No	Course Code	Title of the Course	Offered by	Chosen by
1	17MB80	Industrial Engineering and Management	MBA	AE, CE, CSE, ECE, EEE, EIE & IT
2	17MB81	Project Management	MBA	AE, CE, CSE, ECE, EEE, EIE, IT & ME
3	17MB82	Logistics and SupplyManagement	MBA	AE, CE, CSE, ECE, EEE, EIE, IT & ME
4	17MB83	Banking and InsuranceManagement	MBA	AE, CE, CSE, ECE, EEE, EIE, IT & ME

OPEN ELECTIVE – II (VII Semester)

S.NO	Course Code	Title of the Course	Offered by	Chosen by
1	17AE80	Principles of Flight	AE	CE, CSE, ECE, EEE, EIE, IT & ME
2	17CE80	Basic Civil Engineering	CE	AE, CSE, ECE, EEE, EIE, IT & ME
3	17CS80	Java Programming	CSE	AE, CE, ECE, EEE, EIE & ME
4	17CS81	Introduction to Operating Systems	CSE	AE, CE, ECE, EEE, EIE & ME
5	17EC80	Satellite Technology	ECE	AE, CE, CSE, EEE, EIE, IT & ME
6	17EC81	Analog and Digital Communications	ECE	AE, CE, CSE, EEE, IT & ME
7	17EE80	Basic Control Systems	EEE	AE, CE, CSE, IT & ME
8	17EE81	Utilization of Electrical Energy	EEE	AE, CE, CSE, ECE, EIE, IT & ME
9	17EI80	Instrumentation Technology	EIE	AE, CE, CSE, ECE, EEE, IT & ME
10	17IT80	Introduction to Database	IT	AE, CE, ECE, EEE, EIE & ME
11	17ME80	Optimization Techniques	ME	AE, CE, CSE, ECE, EIE & IT
12	17ME81	Elements of AutomobileEngineering	ME	AE, CE, CSE, ECE, EEE, EIE, & IT

OPEN ELECTIVE – III (VIII Semester)

S.No.	Course Code	Title of the Course	Offered by	Chosen by
1	17AE81	Space Technology	AE	CE, CSE, ECE, EEE, EIE, IT & ME
2	17CE81	Disaster Management	CE	AE, CSE, ECE, EEE, EIE, IT & ME
3	17CS82	Internet Technologies	CSE	AE, CE, ECE, EEE, EIE & ME
4	17CS83	Shell Programming	CSE	AE, CE, ECE, EEE, EIE & ME
5	17EC82	Elements of Communication Systems	ECE	AE, CE, CSE, IT & ME
6	17EC83	Systems and Signal Processing	ECE	AE, CE, CSE, IT & ME
7	17EE82	Energy Auditing	EEE	AE, CE, CSE, ECE, EIE, IT & ME
8	17EE83	Renewable Energy Sources	EEE	AE, CE, CSE, ECE, EIE & IT
9	17EI81	Nano Technology	EIE	AE, CE, CSE, ECE, EEE, IT & ME
10	17IT81	Computer Networks	IT	AE, CE, EEE & ME
11	17ME82	Robotics and Automation	ME	AE, CE, CSE, ECE, EEE & IT
12	17ME83	Mechanical Handling Systems and Equipments	ME	AE, CE, CSE, ECE, EEE, EIE & IT

B.Tech. (I Sem.)	17FE01 - PROFESSIONAL COMMUNICATION – I	L	T	P	Cr.
		3	-	-	3

Pre-requisites: Basics in English Grammar & Vocabulary

Course Educational Objective:
To improve the proficiency of students in English with an emphasis on Vocabulary& Grammar for better communication in formal and informal situations;Develop listening skills required for thorough understanding and analysis to face interviews with confidence.

Course Outcomes: At the end of the course, the student will be able to
CO1: Use English vocabulary & grammar effectively while speaking and writing.
CO2: Comprehend the given text and Communicate confidently in formal and informal contexts.
CO3: Draft E-mails& Memos
CO4: Understand the written and spoken information thoroughly.
CO5: Face interviews with confidence.

UNIT – I
Presidential Address – Dr. A.P.J. Abdul Kalam
Vocabulary: Word formation: Prefixes, suffixes & Compound Collocations
Grammar: Punctuation; Parts of Speech
Reading: Double Angels, David Scott
Writing: Sentence structure; Paragraph writing& Dialogue writing

UNIT – II
SatyaNadella's E-Mail to his Employees
Vocabulary: Homonyms, Homophones, Homographs (Words often confused)
Grammar: Types of verbs; Types of sentences
Reading: The Road Not Taken – Robert Frost
Writing: Letter Writing: Official Letters

UNIT – III
Technology with a Human Face – E.F.Schumacher
Vocabulary: Synonyms & Antonyms, commonly misspelt words
Grammar: Tenses: Types & Uses
Reading: Extract from 'Preface' to Lyrical Ballads – William Wordsworth
Writing:E-mails; Memo drafting

UNIT – IV
Listening Skills: The boy who broke the bank – Ruskin Bond; Importance of active listening; understanding the people; understanding places &events;expanding the proverbs on listening& listening at work place.

UNIT – V
Interview Skills: The lighthouse keeper of Aspinwall – Henryk Sienkiewicz; Interview skills from the story; expanding proverbs on Interview skills; Tips for attending an Interview - Covering letters for job applications & Writing a CV/Résumé

TEXT BOOKS

1 Board of Editors, "Fluency in English – A Course book for Engineering Students", Orient Black Swan, Hyderabad, 2016
2 Dhanavel S.P, "English and Soft Skills", Orient Black Swan, Hyderabad, 2010.

REFERENCES

1. Murphy, "English Grammar with CD", Cambridge University Press, New Delhi, 2004.
2. Rizvi Ashraf M., "Effective Technical Communication", Tata McGraw Hill, New Delhi, 2008
3. BaradwajKumkum, "Professional Communication", I.K.International Publishing House Pvt.Lt., New Delhi, 2008.
4. Raman, Meenakshi and Sharma, Sangeeta, . "Technical Communication -Principles and Practice".Third Edition. New Delhi: Oxford University Press. 2015.

B.Tech.(ISem.)

17FE05 - DIFFERENTIAL EQUATIONS AND NUMERICAL APPLICATIONS

L	T	P	Cr.
3	2	-	4

Pre-requisites: Basics of Differential Calculus

Course Educational Objective :
The objective of this course is to introduce the first order and higher order differential equations, functions of several variables. They also learn the numerical techniques of solving the differential equations.

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

CO1: Apply first order and first degree differential equations to find Orthogonal trajectories and to calculate current flow in a simple LCR circuit.
CO2: Discriminate among the structure and procedure of solving a higher order differential equations with constant coefficients and variable coefficients.
CO3: Developing continuous functions as an infinite series and compute the Jacobian to determine the functional dependence.
CO4: Formation of partial differential equations and solve linear partial differential equations.
CO5: Apply various Numerical methods in solving and initial value problem involving an ordinary differential equation.

UNIT –I
Differential Equations of First Order and First Degree
Differential equations of first order and first degree – Exact and Non Exact Differential Equations, Applications to Orthogonal trajectories, Newton's Law of Cooling and Law of Growth and Decay.

UNIT –II
Higher Order Differential Equations
Linear differential equations of second and higher order with constant coefficients, method of variation of parameters.

UNIT – III
Functions of Several variables
Generalized Mean Value Theorem (without proof), Maclaurin's series, Functions of several variables, Jacobians (polar, cylindrical, spherical coordinates), Functional dependence , Maxima and Minima of functions of two variables with constraints and without constraints – Lagrangian Multiplier Method.

UNIT – IV
Partial Differential Equations.
Formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions.Solution of first order and first degree linear partial differential equation – Lagrange's method.

UNIT – V
Numerical solution of Ordinary Differential Equations
Numerical solution of Ordinary Differential equations, Solution by Taylor's series - Picard's Method of successive approximations - Euler's Method - Runge- Kutta Methods.

TEXT BOOKS

1. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH Publications, New Delhi, 2010.

REFERENCE

1. M. D. Greenberg, "*Advanced Engineering Mathematics*", 2nd Edition, TMH Publications, New Delhi, 2011.
2. Erwin Krezig, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley &Sons, New Delhi, 2011.
3. W. E. Boyce and R. C. Diprima, "*Elementary Differential equations*", 7th Edition, John Wiley and sons, New Delhi, 2001.

B.Tech. (I Sem.) **17FE15 – ENGINEERING CHEMISTRY**

L	T	P	Cr.
4	-	-	4

Pre-requisites: Knowledge of galvonic cell, working principle of battery, concept of polymerization,qualitative and quatitative analysis.

Course Educational Objectives :
To impart knowledge on various types of electro chemical energy systems, corrosion prevention methods and characteristics of various engineering materials.
To enable the students to obtain knowledge on photo chemical processes, liquid crystals, analytical and spectroscopic techniques of chemical analyses.

Course Outcomes : At the end of the course, the student will be able to :
CO1: Analyze different types of electrodes and batteries for technological applications.
CO2: Apply the principles of corrosion in order to maintain various equipments more effectively.
CO3: Identify the importance of engineering materials like nano materials, plastics and rubbers.
CO4: Analyze various photo chemical processes & applications of liquid crystals.
CO5: Identify the importance of analytical and spectroscopic techniques in chemical analyses.

UNIT – I
ELECTRO CHEMISTRY & BATTERIES
Introduction: Electrode potential, standard reduction and oxidation potentials (S.R.P and S.O.P), E.M.F/cell potential of a cell.
Nernst equation: Derivation and problems.
Reference Electrode: Standard hydrogen electrode (S.H.E), calomel electrode, measurement of electrode potential, electro chemical series and applications.
Types of batteries: Primary, secondary and reserve batteries, dry battery(Leclanche cell), Nickel-Cadmium battery, Magnesium - Copper reserve battery.
Fuel Cells: Hydrogen- Oxygen fuel cells.

UNIT – II
SCIENCE OF CORROSION
Introduction: Definition, Examples.
Dry Corrosion (Direct Chemical corrosion): Types of dry corrosion-oxidative corrosion, Pilling Bed worth rule, corrosion by other gases and liquid metal corrosion.
Wet Corrosion (Electro Chemical corrosion): Mechanism- oxygen absorption, hydrogen evolution, types of wet corrosion, Galvanic Corrosion, Concentration Cell Corrosion, passivity and Galvanic series.
Factors Influencing Corrosion: Nature of metal (Purity, position in galvanic series, relative area of cathode & anode, nature of surface film) and nature of environment(temperature, humidity, atmospheric pollution and nature of ions in the medium).

Control of Corrosion: Cathodic Protection - Sacrificial anode and impressed current methods, electro plating and metal cladding.

UNIT – III
CHEMISTRY OF ENGINEERING MATERIALS
Nano Materials: Introduction, definition, properties (optical, electrical, mechanical magnetic) preparation of nano materials-sol-gel method and applications of nano materials.

Polymers: Definition, basic terminology, diferences between thermosets &thermoplasts, types of polymerization(addition,condensation and copolymerisation), preparation, properties and engineering applications of bakelite and PMMA, conducting polymers- extrensic, intrensic conducting polymers and fiber reinforced plastics (FRP).
Rubbers: Definition, processing of natural rubber and drawbacks, vulcanization - advantages, preparation, properties and applications of BUNA-S and thiokol.

UNIT – IV
PHOTO CHEMISTRY & LIQUID CRYSTALS
Introduction: Definition, differences between thermal and photo chemical reactions.
Laws of Photo Chemistry: Grothers-Droper law, Stark-Einstein law and quantum efficiency(Definition only).
Photo Physical processes: Fluorescence, phosphorescence – applications, chemiluminiscence, bio-luminescence and Photo-sensitization.
Liquid crystals: Definition, identification and structural aspects of molecules to form liquid crystals.
Classification of liquid crystals: Thermo tropic liquid crystals and types, lyotropic liquid crystals and applications.

UNIT – V
ANALYTICAL TECHNIQUES
Introduction: Types of analysis.
Physical analysis: Analysis of physical characteristics.
Chemical analysis: Gravimetric and volumetric analysis (basic concept only).
Instrumental analysis: Electro analytical techniques – Introduction.
Conducto metric techniques:strong acid -strong baseand strong acid-weak base, weak acid - strong base and weak acid -weak base – advantages.
Potentiometrictechniques: Acid-base and oxidation-reduction titrations-advantages.
Colorimetrictechniques: Principle and determination of iron by using thiocynate as a reagent.

SPECTROSCOPY
Introduction: Origin of electronic spectra, types of spectra-emission and absorption spectra and Beer-Lambert's law.
IR-Spectroscopy: Types of vibrations, factors influencing vibrational frequencies and applications of IR-Spectroscopy.
UV-Spectroscopy: Types of electronic transitions, probability, Chomophores, Auxochromes and applications of UV-Spectroscopy.

TEXT BOOKS
1. Shikha Agarwal, "A Text book of Engineering Chemistry", Cambridge University Press, New Delhi, 1st Edition, 2015.
2. Jain, Jain, "A textbook of Engineering Chemistry",Dhanpat Rai Publicating Company, New Delhi, 16th Edition, 2015.

REFERENCES
1. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 3rd Edition, 2003.
2. S.S. Dara, S.S. Umare, "A Text book of Engineering Chemistry",S.Chand Publications, New Delhi, 12th Edition, 2010.
3. Y. BharathiKumari and Jyotsna Cherukuri, "A Text book of Engineering Chemistry", VGS Publications, Vijayawada, 1st Edition,2009.

B.Tech. (I Sem.) **17CI01 - COMPUTER PROGRAMMING**

L	T	P	Cr.
2	2	-	3

Pre-requisites : NIL

Course Educational Objective: In this course student will learn about
The basic elements of C programming structures like data types, expressions, control statements, various I/O functions and how to solve simple mathematical problems using control structures.The derived data types like arrays, strings, various operations on them. Modular programming using functions and Memory management using pointers.User defined structures and various operations on it.The basics of files and its I/O operations.

Course Outcomes: At the end of the course, the student shall be able to:
CO1: Identify basic elements of C programming structures like data types, expressions,control statements, various simple functions and inview of using them in problem solving.
CO2: Apply various operations on derived data types like arrays and strings in problem solving.
CO3: Design and Implement Modular Programming and memory management using pointers.
CO4: Implement user defined data structures used in specific applications.
CO5: Compare different file I/O operations on text andbinary files.

UNIT – I
Introduction to Problem solving through C-Programming: Problem Specification.
Algorithm / pseudo code, flowchart, examples.
C-Programming: Structure of C program, identifiers, basic data types and sizes, Constants, variables, Input-output statements, A sample C program, operators: arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence of operators and order of evaluation.
Conditional statements: if, if else, else if ladder and switch statements, continue, goto. Loops: while, do-while and for statements, break, programming examples.

UNIT – II
Arrays- one dimensional arrays-concept, declaration, definition, accessing elements, storing elements, two dimensional and multi-dimensional arrays.
Character Strings: declaration, initialization, reading, writing strings, arithmetic operations on characters, string handling functions, programming examples

UNIT – III
Functions: basics, category of functions, parameter passing techniques, recursive functions-comparison with Iteration, Functions with arrays, storage classes- extern, auto, and register, static, scope rules, Standard library functions, dynamic memory management functions, command line arguments, programing examples.
Pointers- concepts, declaring &initialization of pointer variables, pointer expressions, pointer arithmetic, pointers and arrays, pointers and character strings, pointer to pointer, Pre-processor Directives and macros.

UNIT –IV

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, array of structures, structures and functions, pointer to structure, self-referential structures, unions, typedef, programming examples.

UNIT – V

Files – concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations, error handling, and programming examples.

TEXT BOOKS

Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, Pearson Publishers, 7th Edition, 2013

REFERENCE

1. N.B.Venkateswarlu and E.V.Prasad, C and Data Structures, S.Chand Publishing, 1st Edition, 2010,
2. ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015
3. Stephen G.Kochan, Programming in C, Pearson Education, 3rd Edition, 2005
4. PradeepDey, Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition, 2011
5. E Balagurusamy, Computer Programming, McGraw Hill Education, 1st Edition

B.Tech. (I-Sem.) 17EC02 – ELECTRONIC DEVICES AND CIRCUITS	L	T	P	Cr.
	2	2	-	3

Pre-requisites : Fundamentals of Physics.

Course Educational Objective:
This course gives an overview of carrier transport phenomena in semiconductor, characteristics and applications of semiconductor devices like p-n junction diode, Bipolar Junction Transistor (BJT), Field Effect Transistor (FET), Metal oxide Semiconductor Field Effect Transistor (MOSFET) and various special devices. Emphasis is placed on analysis, selection and proper biasing of transistors like BJT and FET.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Remember the transport phenomena of charge carriers in a semiconductor.
CO2: Understand the operation of Diode, BJT and FET.
CO3: Apply different types of filters in AC to DC conversion.
CO4: Analyze the different types of diodes, operation and its characteristics.
CO5: Evaluate the different biasing techniques used in BJT and FET.

UNIT – I
Semiconductor Physics: Energy band theory of crystals,conductors, insulators, semiconductors,mobility and conductivity,energy distribution of electrons,electrons and holes in an Intrinsic Semiconductor, Conductivity of a semiconductor, Carrier concentrations in an intrinsic Semiconductor, donor and acceptor impurities, mass action law,charge densities in a semiconductor with impurities, fermi level in a semiconductor with impurities, diffusion, carrier lifetime,continuity equation, hall effect.

UNIT – II
Semiconductor Diode Characteristic: Qualitative theory of the p-n Junction, p-n junction as a diode,band structure of an open circuited p-n Junction,current components in diode, qualitative theory of diode currents, Volt-Ampere Characteristic,temperature dependence of diode characteristics,diode resistance, diode capacitance-Transition and Diffusion capacitance.
Special Diodes: Operation and characteristics of Zener diode, Tunnel diode, Varactordiode, Photo diode, PIN diode, Avalanche photo diode, LASER, LED, Liquid Crystal Display, Solar cell.

UNIT – III
Rectifiers: Half wave rectifier, Full wave rectifier with center tap transformer and Bridge circuit - Derivation for DC, RMS currents and voltages, Ripple factor, Efficiency, Peak inverse voltage, Transformer utilization factor and Percentage of regulation, Comparison of rectifiers, Harmonic components in a rectifier circuit.
Rectifiers using filters: Inductor filter, Capacitor filter, L-Section filter, π-Section filter, Multiple L-Section and π -Section filters.
Regulators: Design of **v**oltage regulator using Zener diode, series and shunt voltage regulators.

UNIT – IV
Bipolar Junction Transistor (BJT): Introduction to three terminal devices, BJT-construction , types and different regions of operations, Transistor (BJT) as an amplifier, Transistor Current components-Emitter efficiency, Transport factor, Large signal current gain, Input and Output

characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, relation between α , β and γ, base width modulation,Ebers-Moll Model.

Field Effect Transistors (FET): Comparison between FET and BJT, classification of FET; construction, operation, Drain and Transfer Characteristics of JFET and MOSFET.

Optical and Power Electronic Devices: Operation and characteristics of Photo Transistor, Silicon Controlled Rectifier, and Uni-Junction Transistor (UJT).

UNIT – V

BJT Biasing: Need for biasing,Transistor biasing and stability- operating Point, DC load line, AC load line, Stability factors S,S^1 and S^{11},types of biasing - Fixed Bias, Collector to Base bias and Self bias with and without emitter resistance, Thermal runaway and stability- Condition to avoid Thermal Runaway,bias compensation techniques- diode compensation for $V_{BE}$and $I_{CO,}$ thermistor and sensistor compensation.

FET Biasing: FET biasing methods – design offixed bias, self-bias and voltage divider bias.

TEXT BOOKS

1. Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", Tata McGraw Hill, Publishers, New Delhi.
2. Ben Streetman and Sanjay Banerjee , "Solid State Electronic Devices", Prentice Hall

REFERENCES

1. Thomas L.Floyd, Electronic Devices, Pearson Education Publishers.
2. Allen Mottershed, "Electronic Devices and Circuits", PHI Publishers.
3. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, Pearson/Prentice Hall Publishers.

B.Tech. (I Sem.) **17FE65 – ENGINEERING CHEMISTRY LAB**

L	T	P	Cr.
-	-	2	1

Pre-requisites : Knowledge of volumetric titration.

Course Educational Objectives:
To impart the ability to analyze water for its quality and to determine the important parameters like alkalinity and to distinguish types of titrations in volumetric analysis.To gain hands on experience in the preparation of polymers and to perform experiments based on theoretical fundamentals.

Course Outcomes: At the end of the course, the student will be able to:
CO1 : Assess alkalinity of water based on the procedure given.
CO2 : Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus**.**
CO3 : Acquire practical knowledge related to preparation of polymers.
CO4 : Exhibit skills in performing experiments based on theoretical fundamentals.

Introduction
1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
2. Preparation of standard solutions, concept of standardisation, dilution to get solution of required normality.
3. Model experiment - Determination of HCl using standard Na_2CO_3 solution.

Water analysis
4. Determination of alkalinity of water sample.

Complexometric titrations
5. Estimation of $Mg^{+2}/Zn^{+2}/Ca^{+2}$ in given solution by using standard EDTA solution.

Preparation of polymers
6. Preparation of Urea formaldehyde resin.
7. Preparation of Phenol formaldehyde resin.

Redox titrations
8. Estimation of Mohr's salt by using potassium permanganate.
9. Estimation of Mohr's salt by using potassium dichromate.
10. Estimation of $KMnO_4$ by using oxalic acid.

Conductometric measurements
11. Estimation of amount of HClconductometricallyusing standardNaOH solution.
12. Estimation of amount of HClconductometrically using NH_4OH solution .

Potentiometric measurements
13. Estimation of amount of HClpotentiometrically using NaOH solution.
14. Estimation of amount of Fe^{+2}potentiometrically using $KMnO_4$ / $K_2Cr_2O_7$solution.

Demonstration Experiments
15. Determination of pH of the given sample solution using pH meter.
16. Determination of turbidity of the given sample water.

Colorimetric Analysis
17. Determination of Iron by a Colorimetric method using thiocynate as a reagent.

REFERENCES
Lab manual

L	T	P	Cr.
		2	1

B.Tech. (I Sem.) **17CI60 - COMPUTER PROGRAMMING LAB**

Pre-requisites : NIL

Course Educational Objective: In this course student will learn about
Software development tools like algorithm, Pseudo codes and programming structure. Basic elements of C programming structures like data types, expressions, Control statements, various I/O functions and how to solve simple mathematical Problems using control structures. Designand implementation ofvarious software components which solve real world problems.

Course Outcomes: At the end of the course, the student will be able to
CO1: Apply and practice logical formulations to solve some simple problems leading to specific applications.
CO2: Demonstrate C programming development environment, compiling, debugging, linking and executing a program using the development environment.
CO3: Design effectively the required programming components that efficiently solve computing problems in real world.
Mandatory: All Programs must have Algorithms and Flow Charts

LAB CYCLESSYLLABUS

I) Exercise Programs on Basics of C-Program
Write a program in 'C' language to cover the following problems.
a) Example program which shows the usage of various preliminaryData types available in C Language.
b) Example program which shows the usage of various Operators available in C Language.
c) Example programs to illustrate the *order of evaluation.*

II) Exercise Programs on Control Structures:
a) To check whether the given year is leap year (or) not
b) Roots of Quadratic Equation.
c) Finding smallest& biggest number from the given set of 4 numbers using 'if' statement.
d) Calculate the student grade in the examination – assume suitable Constraints.
e) Prepare electricity bill for the consumed units – assume suitable Constraints.
f) Converting given two digit number into words using switch statement
g) To illustrate the usage of 'goto' statement.

III) Exercise Programs on Loops:
a) To Display first N natural numbers
b) To find whether the given number is Armstrong (or) not
c) To find reverse of the given number and to check whether it is palindrome (or) not.
d) To find whether given number is strong number (or) not.
e) To check whether given number is Prime (or) not
f) To display prime numbers with in the given range (Nesting of Loops).
g) To display the following structure (Nesting of Loops)

i)

```
        1
      1   2
    1   2   3
  1   2   3   4
1   2   3   4   5
```

ii)

```
5 4 3 2 1
  4 3 2 1
    3 2 1
      2 1
        1
```

IV) Exercise Programs on Arrays& Strings:

Write example programs in C Language to perform following operations:

a) Finding the sum and average of given numbers using Arrays.
b) To display elements of array in reverse order
c) To search whether the given element is in the array (or) not using linear search &binary search.
d) Write a C program to perform the following operations
   i) Addition, subtraction and multiplication of Matrices
   ii) Transpose of given matrix
   (The above operations are to be exercised using functions also bypassing arguments)
e) Write a C program to find whether the given string is palindrome (or) not.
f) To accept line of text and find the number of characters, number of vowels andnumber of blank spaces in it.
g) Write an example program to illustrate the use of any 5 stringhandling functions.

V) Exercise Programs on Functions &Pointers:

a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.
b) Write an example program to describe the usage of *call by reference*.
c) Write a program to find sum of the elements of the array using functions.

VI) Exercise Programs on Functions:

Write example programs in C Language:

a) To find factorial of a given number using functions.
b) Swap two numbers using functions.
c) To find GCD of two numbers using recursion
d) Write a recursive function to solve Towers of Hanoi problem.
e) Write an example program to illustrate use of external &static storage classes.
f) Write an example program to illustrate the usage of command line arguments.
g) Program to illustrate the usage of dynamic memory management functions.

VII) Exercise Programs on Derived data types:

a) Write an example program using structures to process the student record. Assume suitable fields for student structures (Different kinds of initialization of structure variables are to be exercised)
b) Write a program to read records of 10 employees and find their average salary (Exercise array of structures & Nested structures concepts through this program).
c) Write a program to handle a structure variable using pointers and implement self referential structure(i.e. A structure variable having a pointer to itself)

VIII) Exercise Programs on Files:

Write an example program on file to perform following operations:

a) Accessing content from files and writing content in to it.
(Exercise different file operation modes)
b) Copy the contents of one file into another.
(Exercise different file operation modes)

B.Tech. (I-Sem.)	17EC61 – ELECTRONIC DEVICES AND CIRCUITS LAB	L	T	P	Cr.
		-	-	2	1

Course Educational Objective : This course gives an overview of basic lab equipments like CRO, Function generator, calculation basic semiconductor device parameters from their characteristics and application of p-n junction diode in rectifier circuits.

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

CO1: Operate basic lab equipment used to generate and measure the voltage, frequency and phase of any waveform.
CO2: Analyze the characteristics of different electronic devices such as diode and transistor.
CO3: Apply the knowledge of diode to construct rectifier circuits.

List of Experiments

(The following experiments are to be simulated using PSPICE/MULTISIM/LABVIEW Software and verified by Bread board)
(Minimum 12 experiments to be conducted)

1. Study of functionality basic devices and lab equipments.
2. Measurement of signal characteristics using CRO.
3. PN Junction diode Volt-Ampere characteristics.
4. Zener diode Volt-Ampere characteristics.
5. Half wave rectifier withoutfilter.
6. Half wave rectifier with capacitor and inductor filter.
7. Full wave rectifier without filter.
8. Full wave rectifier with capacitor and inductor filter.
9. Bridge rectifier circuit with and without filter.
10. Transistor Characteristics under CB Configuration.
11. Transistor Characteristics under CE Configuration.
12. Transistor Characteristics under CC Configuration.
13. Drain and Transfer Characteristics of Field Effect Transistor.
14. Uni-Junction Transistor Characteristics.

L	T	P	Cr.
1	-	2	2

B.Tech. (I Sem.) **17CI61 - IT WORKSHOP**

Pre-Requisites: The students should have knowledge in computer usage.

Course Educational Objective : After completing this course, students will be able to Identify the basic peripherals, understand the process of assembling a personal computer and installation of system software like MS Windows, Create professional documents using word, LaTeX, excel spread sheets and power point presentations and work with visual programming development environment based on flowcharts. Using RAPTOR Interpreter

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

CO1 : Develop skill in S/W and H/W trouble shooting, and solve the problems of assembling and OS installation.
CO2 : develop skill in using office suite.
CO3 : develop skill in using tools like RAPTOR, LaTeX and adobe Photoshop.

Week 1 PC Hardware
Task: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Week 2
Task: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Week 3
Task 1: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Week 4
Task 1: Word Orientation: The mentor needs to give an overview Microsoft word: Importance of word tool, Details of toolbars, saving files, Using help and resources, rulers.
Task 2: Using word to create project certificate. Features to be covered:-Formatting Fonts in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Week 5
Task: Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Week 6
Task 1: Introduction to LaTeX – A document preparation system.
Task 2: Using LaTeX to create project certificate.
Features to be covered:- Formatting Fonts, Applying Text Effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option, Formatting

Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes, etc..,

Week 7
Task 1: Excel Orientation: The mentor needs to tell the importance of MS Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel - Accessing, overview of toolbars, saving excel files, Using help and resources.
Task 2: To create student progress report - Features to be covered: - Cell Referencing, Formulae in excel - average, Charts, Split cells, Sorting, Boolean and logical operators, Conditional formatting.

Week 8
Task: Create cricket score card in excel to display over rate and run rate graphs. Features to be covered: - Cell Referencing, Formulae in excel - average, Charts, Split cells, Sorting, Boolean and logical operators, Conditional formatting.

Week 9
Task1: power point Orientation Students will be working on basic utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Lines and Arrows in Power point.
Task 2: create a power point presentation for LBRCE Topic covered during this task includes: Hyperlinks, Inserting -Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Week 10
Photo shop Orientation Students will be working on Basic utilities and tools which help them to edit a photograph. Topic Covered during this week includes: - Details of toolbars, saving files, Using help and resources.

Week 11
Task 1: The mentor needs to tell the importance of RAPTOR as a Flowchart Interpreter tool, give the details of the visual programming development environment based on flowcharts. Topics to be covered:-RAPTOR Program Structure, RAPTOR Statements/Symbols, RAPTOR Variables.
Task 2: Student needs to practice Examples of raptor flowchart interpreter
i) Raptor Flowchart to Find a Number is Even or Odd.
ii) Raptor Flow Chart to Calculate Grade of a Student.

Week 12
Tips and tricks. Keyboard shortcuts, taskbar, screen shot, taking advantage of search, Task Manager, Power option, schedule tasks, user accounts, disk management, device manager, shared folders and folder options.

REFERENCES

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
3. PC Hardware and A+Handbook - Kate J. Chase PHI (Microsoft).
4. Raptor Research and Management Techniques, David M. (David Michael), 1949/HANCOCK HOUSE PUBLISHERS LTD.
5. LaTeX Companion - Leslie Lamport, PHI/Pearson.

B.Tech. (II Sem.)	17FE02 - PROFESSIONAL COMMUNICATION - II	L	T	P	Cr.
		3	-	-	3

Pre-requisites: Students should have basics in English vocabulary andGrammar & they should write error free sentences

Course Educational Objective : To Improve vocabulary, Grammar, Verbal – Non verbal Communication; to develop adaptability, assertive skills and Team spirit for skillful management in work place; and to Interpret technical data given in the form of charts, graphs & pictograms for writing technical reports.

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

CO1 : Use appropriate vocabulary to interpret data thoroughly and to write reports effectively.
CO2 : Face any situation with confidence and voice opinions/decisions assertively.
CO3 : Use English Language effectively in spoken and written forms.
CO4 : Work effectively in teams for better result.
CO5 : Communicate effectively using verbal and non-verbal dimensions aptly.

UNIT – I
Good Manners – J.C. Hill
Vocabulary: Idioms; One-word substitutes
Grammar: Subject-Verb agreement (Concord)
Reading: If – Rudyard Kipling
Writing: Information transfer: Tables, Bar graphs, Line graphs, Pie charts, Flow charts, Tree Diagrams, Pictograms; Note-making& Abstract/Summary writing

UNIT – II
Assertive Skills: Verger – Somerset Maugham; Assertive skills from the story; Assertive skills at personal level & at workplace; Expanding proverbs & their Significance
Team work skills: White washing the fence – Mark Twain; Teamwork skills from the story; Teamwork at work place & its Importance

UNIT – III
Oh Father, Dear Father – Raj Kinger
Vocabulary: Foreign Languages and their Influence on English
Grammar: Conditional Sentences; Degrees of Comparison; Question Tags
Reading: Basic Education – M.K. Gandhi
Writing: Report Writing: Nature, Significance & Types of Reports

UNIT – IV
Adaptability: Sen˜or Payroll – W E Barrett; Understanding the Organizational Communication; Adaptability skills from the story; Expanding proverbs on Adaptability skills; Importance at work place & Real life - Active & Passive Voice; Direct & Indirect Speech.

UNIT – V

Non-Verbal Communication Skills: A real good smile – Bill Naughton; 'Wh' & 'Yes' or 'No' questions; Working on articulation and gestures; Non-Verbal Communication Skills from the story; Expanding the proverbs on Non-Verbal Communication; enhancing skills through real life experiences - Common Errors.

TEXT BOOKS

1. Board of Editors, "Fluency in English – A Course book for Engineering Students", Orient Black Swan, Hyderabad, 2016
2. Dhanavel S.P, "English and Soft Skills", Orient Black Swan, Hyderabad, 2010.

REFERENCES

1. Murphy, "English Grammar with CD", Cambridge University Press, New Delhi, 2004.
2. Rizvi Ashraf M., "Effective Technical Communication", Tata McGraw Hill, New Delhi, 2008
3. BaradwajKumkum, "Professional Communication", I.K.International Publishing House Pvt.Lt., New Delhi, 2008.
4. Raman, Meenakshi and Sharma, Sangeeta, . "Technical Communication -Principles and Practice".Third Edition. New Delhi: Oxford University Press. 2015.

B.Tech. (II Sem.)	17FE06 - TRANSFORMATION TECHNIQUES AND VECTOR CALCULUS	L	T	P	Cr.
		3	2	-	4

Pre-requisites: Basics of Integral Calculus and Vector Calculus

Course Educational Objective : In this course the students are introduced to Integral transformations which includes Laplace Transforms and Z – Transforms. They will also learn Multiple Integrals in different coordinate systems and Vector Calculus.

Course Outcomes : At the end of the course, the student will be able to :
CO1: Apply the concepts of Laplace Transforms to solve ordinary differential equations.
CO2: Apply Z - Transforms to solve difference equations
CO3: Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes.
CO4: Evaluate the directional derivative, divergence and angular velocity of a vector function.
CO5: Apply Vector Integration for curves, surfaces and volumes and relationship among themselves.

UNIT – I
Laplace Transforms
Laplace transforms of standard functions –Linear Property - Shifting Theorems, Change of Scale Property – Multiplication and Division by‘t’ - Transforms of derivatives and integrals – Unit step function –Dirac’s delta function..
Inverse Laplace Transforms
Inverse Laplace transforms– Linear Property - Shifting Properties - Convolution theorem, Applications of Laplace transforms to ordinary differential equations.

UNIT – II
Z-Transforms
Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse Z –transform - Convolution theorem – Solution of difference equation by Z-transforms.

UNIT – III
Multiple Integrals
Multiple integrals - double and triple integrals (Cartesian, polar, spherical coordinates) – Changing of order of Integration and applications to areas and volumes.

UNIT – IV
Vector Differentiation
Vector Differentiation: Gradient- Directional Derivatives -Divergence – Solenoidal fields- Curl – Irrotational fields-potential surfaces - Laplacian and second order operators and related properties of sums and products

UNIT – V
Vector Integration
Vector Integration - Line integral – work done –area - surface and volume integrals. Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems

TEXT BOOKS

1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. Dr. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH, New Delhi, 2010.

REFERNCES

1. Michael D. Greenberg , "*Advanced Engineering Mathematics*", 2nd Edition, TMH, New Delhi, 2011.
2. Erwin Krezig, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley & Sons, New Delhi, 2011.

L	T	P	Cr.
3	2	-	4

B.Tech. (II Sem.) **17FE12 - APPLIED PHYSICS**

Pre-requisites : Basics in Light, Conductivity in different solid materials etc.,

Course Educational Objective : To make students learn the basic concepts of Optics such as Interference, Diffraction, Polarization and Lasers; the principle of quantum mechanics, free electron theory of metals, Concept of semi conductors, diodes and different types of polarizations in dielectrics and their applications.

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

Co1:Define the nature of Interference and Diffraction.
Co2: Describe the polarization and LASER, types of lasers and their applications.
Co3: Estimate the electrical conductivity in metals.
Co4: Design the circuits of semiconductor diodes, LED, Photodiode, Solar cell.
Co5: Classify the different types of polarisations in dielectric materials.

UNIT – I : INTERFERENCE AND DIFFRACTION

INTERFERENCE: Introduction, coherence, Conditions for Interference, Interference in thin film by reflection, Newton's rings (reflection), Working principle of Interferometer.

DIFFRACTION: Introduction, Diffraction, Fraunhofer diffraction at single slit- Diffraction due to circular aperture –Diffraction due to N- slits- Diffraction Grating- Resolving power of Grating, Telescope.

UNIT – II : POLARIZATION AND LASERS

POLARIZATION: Introduction – Polarization of light, Brewster's law –Double refraction ,Quarter wave plate – Half wave plate - Polarimeter.

LASERS: Introduction- Characteristics of Lasers – Principle of laser (Absorption, Spontaneous and stimulated emission of Radiation), Einstein Coefficients - Nd-YAG laser, Helium Neon Laser.

UNIT – III : PRINCIPLESOF QUANTUM MECHANICS&FREE ELECTRON THEORY

PRINCIPLES OF QUANTUM MECHANICS

De Broglie waves, Experimental verification- Schrodinger wave equation-time independent wave equation, physical significance of the wave function – particle in a box.

FREE ELECTRON THEORY

Classical free electron theory- Postulates , Expression for electrical conductivity and drift velocity, Advantages and Draw backs, Fermi-Dirac statistics(qualitative treatment only), Classification of Solids on the basis of Band theory.

UNIT – IV: SEMI CONDUCTOR PHYSICS

Conductivity of Intrinsic and Extrinsic semiconductors, Drift and Diffusion Einstein relation, Hall Effect, Differences between direct and indirect Band Gap semiconductors, LED, photo detector, Solar Cell, Applications of Solar Cells.

UNIT – V: DIELECTRIC MATERIALS

Dielectric polarization (Electronic, ionic, orientation polarization), Local field, ClaussiusMosotti equation, Dielectric loss, Ferro electricity, Piezoelectricity, Dielectric breakdown, Applications of dielectric materials.

TEXT BOOKS

1. V. Rajendran, "*Engineering Physics*", TMH, New Delhi, 6th Edition, 2013.
2. D.K.Bhattacharya, Poonam Tandon, " Applied *Physics*", Oxford press, New Delhi, 1st Edition, 2016.

REFERENCES

1. M.N. Avadhanulu, TVS Arun Murthy, "Applied *Physics*", S. Chand & Co., 2nd Edition, 2007.
2. P.K. PalaniSamy, "*Applied Physics*", Sci. Publ. Chennai, 4th Edition, 2016.
3. P. Sreenivasa Rao, K Muralidhar, "*Applied Physics*", Him. Publi. Mumbai, 1st Edition, 2016.
4. HitendraK Mallik , AK Singh " *Engineering Physics*", TMH, New Delhi, 1st Edition, 2009.

B.Tech. (II Sem.) **17EE52 - BASIC ELECTRICAL ENGINEERING**

L	T	P	Cr.
2	2	-	3

Pre-requisites : NIL

Course Educational Objective: This course enables the studentto illustrate the basics of circuits and AC electrical machines. It also deals with basic principles of measuring instruments.

Course Outcomes: At the end of the course, the student will be able to :
CO1: Analyse AC and DC circuits
CO2: Enumerate the working of static& rotating electrical machines
CO3: Analyze the performance of electrical machines
CO4: Interpret the working of various electrical measuring instruments

UNIT – I: Electrical Circuit Fundamentals
Basic definitions, Types of elements-active and passive, Ohm's Law, Kirchhoff's Laws-Network reduction techniques- series, parallel, star to delta, delta to star transformations, source transformations. Numerical problems.

UNIT – II: Network Theorems without proofs (DC Networks)
Mesh Analysis, Nodal Analysis, Theorems -Superposition, Thevenin's, Norton's theorems, Maximum Power Transfer theorem. Numerical problems.

UNIT – III : AC Fundamentals
Peak, R.M.S, average and instantaneous values, Form factor and Peak factor for periodic waveforms – Phase and Phase difference –Concepts of Reactance, Impedance, Susceptance and Admittance, Real , Reactive and apparent Powers, Power Factor- Resonance. Numerical problems.

UNIT–IV: Generalised Treatment of Electrical Machines
Introduction-Dynamo, Generator and Motor-basic Electro-Magnetic Laws-EMF induced in a coil rotating in a magnetic field-physical concept of production of torque-elementary concept of an electrical machine-Common features of rotating electrical machines-Types of rotating electrical machines. Numerical problems.

UNIT – V : Single Phase Transformers & 3-Phase Induction Motor
Single Phase Transformers: Constructional details- principle and operation of single phase transformers-Emf equation-Losses- efficiency and regulation calculations -O.C and S.C tests. Numerical problems.
Induction Motor: Principle and operation of Induction Motors- Types of rotors Slip ring and Squirrel cage motors –Slip- rotor emf and current-torque-starting torque-condition for Maximum Torque –Slip-Torque characteristics. Numerical problems.
Electrical Measuring Instruments: Qualitative treatment

TEXT BOOKS
1. M.S Naidu and S. Kamakshaiah,"Introduction to Electrical Engineering", TMH Publication, 3rd Edition
2. A.Sudhakar and Shyammohan S Palli,"Electrical Circuits" Tata McGraw-Hill, 3rd Edition.

REFERENCES
1. Kothari and Nagarath, "Basic Electrical Engineering" ,TMH Publications, 3rd Edition.
2. V.K.Mehta, "Principles of Electrical Engineering" ,S.Chand Publications.

B.Tech. (II Sem.)	17CI02 - DIGITAL LOGIC DESIGN	L	T	P	Cr.
		2	2	-	3

Pre-requisites: Mathematics, Discrete Mathematics

Course Educational Objective: This course enables the students to know about
Apply the knowledge of mathematics, Computer science and engineering, realize complex logic functions utilizing programmable logic, Design digital circuitry, analyze and interpret data, to learn simple digital circuits in preparation for computer engineering.

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

CO1: Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical forms for digital logic circuit design.

CO2: Apply K-Maps and Tabulation methods for Simplification of Boolean expressions and construct logic circuits**.**

CO3: Design Combinational logic circuits using Adders, Subtractors, Decoders, Multiplexers and Magnitude Comparators.

CO4: Design Sequential logic circuits using Flip-flops, Shift registers, Counters and Memory unit.

CO5: Contrast Programmable logic devices(PROM, PAL, and PLA) and its design**.**

UNIT I: Number Systems

Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion of Numbers from One Radix to another Radix, r's Complement and (r-1)'s Complements,Subtraction of Unsigned Numbers and Signed Binary Numbers, Binary Codes, Basic Gates: NOT, AND, OR, Universal Gates: NAND,NOR, Special Gates: Ex-OR and Ex-NOR Gates. Two level Realization of Logic Functions Using Universal Gates, Error detection and Correction, Hamming Code.

UNIT II: Logic Gates and Boolean algebra

Fundamental postulates of Boolean algebra, Basic theorems and properties, Complement and Dual of Logical Expressions, SOP, POS, Minimizations of Logic Functions Using Boolean Theorems, Karnaugh Map Method **(K-Map):** Minimization of Boolean Functions maximum up to Four Variables, Simplifications With Don't Care Conditions Using K-Map,Prime Implicants, Five Variable K-Maps, Quine-McCluskey Method.

UNIT III: Combinational Logic Circuits

Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Ripple Carry Adder. Design of Decoders, Encoders, Multiplexers, De-multiplexers, Higher Order De-multiplexers and Multiplexers, Priority Encoder, Code Converters, Magnitude Comparator.

UNIT IV: Sequential Logic Circuits

Classification of Sequential Circuits,Basic Sequential Logic Circuits:Latch and Flip-Flop, RS-Latch Using NAND and NOR Gates, RS, JK, T and D Flip-flops, Truth and Excitation Tables, Conversion of Flip Flops, Master-Slave Flip-flops.

Shift Registers and Counters: Introduction, Shift Register and its types, Bi-directional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters, Modulus Counters, Ring Counter, Johnson Counter.

UNIT V: Programmable Logic Devices

Memory unit: RAM and ROM, Programmable Logic Devices: PLA, PAL, PROM, Realization of Switching Functions Using PROM, PAL and PLA, Comparison of PLA, PAL and PROM.

TEXT BOOK

Morris Mano, Michael D Ciletti ,"Digital Design", 4/e, , PEA

REFERENCES

1. Leach, Malvino, Saha,"Digital Logic Design", TMH
2. R.P. Jain, "Modern Digital Electronics", TMH
3. A. Anand Kumar, "Switching Theory and Logic Design", Prentice-Hall Of India Pvt. Limited, 2010.
4. A.P Godse, G.A Godse," Digital Logic Design", T-Publishers,
5. Kohavi, Jha, Cambridge,"Switching and Finite Automata Theory", 3/e

L	T	P	Cr.
-	-	2	1

B.Tech. (II Sem.) **17FE62 – APPLIED PHYSICS LAB**

Pre-requisites : Awareness about the usage of Vernier callipers, Screw Gauge etc.,

Course Educational Objective:
To make students learn the theoretical concepts, Analytical techniques and graphical analysis through completing a host of experiments with the procedures and observational skills using simple and complex apparatus.

Course Outcomes: At the end of the course, the student will be able to :
CO1: Analyze the wave characteristics of light.
CO2: Estimate the wave length and width of the slit with Laser light source.
CO3:Analyze the characteristics of semiconductor diodes.
CO4: Determine the energy band gap and the dielectric constant of a material.

List of Experiments

(ANY 8 EXPERIMENTS)

GENERAL EXPERIMENTS:

1. Study the characteristics of LED.
2. Determine the energy band gap of a semi conductor Diode.
3. Determine the frequency of AC supply by using Sonometer.
4. Study the characteristics of Zener Diode.
5. Study the magnetic field along the axis of a current carrying circular coil using Stewart's & Gee's apparatus and to verify Biot - Savart's law.
6. Study the characteristics of Solar cell
7. Determine the dielectric constant of a dielectric material.
8. Study the characteristics of Photo diode

OPTICS LAB EXPERIMENTS:

9. Determine the wavelength and divergence of a laser radiation.
10. Determine the width of a single slit by forming diffraction pattern.
11. Determine the Radius of Curvature of a Plano - Convex lens by forming Newton's Rings.
12. Find the specific rotation of sugar solution by using a polarimeter.
13. Determine the Refractive index of a material of the given prism.
14. Determine the Wavelengths of various spectral lines by using diffraction grating.
15. Determination of a thickness of thin wire by using wedge shaped film.

TEXT BOOKS

Lab Manual Prepared by the LBRCE.

B.Tech. (II Sem.) 17FE60 - ENGLISH COMMUNICATION SKILLS LAB	L	T	P	Cr.
	-	-	2	1

Pre-requisites: Students should have fundamental knowledge in making sentences and be with readiness to speak

Course Educational Objective:
To improve the proficiency of students in English with an emphasis on better communication in formal and informal situations; Develop speaking skills required for expressing their knowledge and abilities and to face interviews with confidence.

Course Outcomes: At the end of the course, the student will be able to
CO1 : Articulate English with good pronunciation.
CO2 : Manage skilfully through group discussions.
CO3 : Communicate with the people effectively.
CO4 : Collect and interpret data aptly.

Syllabus: English Communication Skills Lab (ELCS) shall have two parts:
- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems, LAN facility and English language software for self- study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorder etc.

Exercise – I
CALL Lab:
Understand:Sentence structure, written language.
ICS Lab:
Practice: Introduction to English Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Phonetic Transcription.

Exercise – II
CALL Lab:
Understand:Usage of various words in different parts of speech.
ICS Lab:
Practice: Ice-Breaking Activity and JAM Session – Introducing Oneself.

Exercise – III
CALL Lab:
Understand:Features of Good Conversation – Strategies for Effective Communication
ICS Lab:
Practice: Situational Dialogues – Role-Play – Expressions in various situations – Making Requests and seeking permissions.

Exercise – IV
CALL Lab:
Understand:Data collection strategies – Interpretation of collected data.
ICS Lab:
Practice: Data interpretation – Information transfer from flow charts, pie charts, bar graphs, pictograms etc.

Exercise – V
CALL Lab:
Understand:Features of Good Conversation – Strategies for Effective Communication.
ICS Lab:
Practice: Introduction to Group Discussions

Lab Manual:
Board of Editors, "ELCS Lab Manual – A Workbook of CALL and ICS Lab Activities", Orient Black Swan Pvt. Ltd., Hyderabad, 2016.

SUGGESTED SOFTWARE:
1. Digital Mentor: Globarena, Hyderabad, 2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley,USA,2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, the Learning Company, USA, 2002
6. Learning to Speak English - 4 CDs. The Learning Company,USA,2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi, 2008.

B.Tech. (II Sem.)	17CS60 - DIGITAL LOGIC DESIGN LAB	L	T	P	Cr.
		-	-	2	1

Pre-requisites: Knowledge of gates designing

Course Educational Objective:
This course enables the students to know about Use of basic gates, decoders and Multiplexers, flip-flops, Counters, Shift registers and PLD's.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Design and Test the functionalities and Properties of Basic Gates, Universal Gates and Special Gates using Logisim Software.
CO2: Design and verify the functionalities of basic building blocks used in Combinational logic Circuits.
CO3: Design and verify functionalities of basic building blocks used in Sequential logic Circuits.

CYCLE 1:
1.(a) Basic Gates Function Verification using truth tables.
i) AND Gate using 7408 IC., ii) OR Gate using 7432 IC.
iii) NOT Gate using 7404 IC.
(b) Universal Gates Functional Verification.
i) NAND Gate using 7400 IC., ii) NOR Gate using 7402 IC.
(c) Special Gates Functional verification.
i) XOR Gate using 7486 IC.
ii) XNOR Gate using XOR followed by NOT Gate.
2. Realization of following gates using universal gates and its functional Verification. AND, OR, XOR, NOT.
3.(a) Design Half-adder and Full-adder circuits and verify its functionality.
(b) Verify the functionality of four bit ripple carry adder for signed and unsigned integers with the verification of overflow condition.
4. Design a four bit comparator and verify its functionality (using logic gates or IC's)
5. Design a BCD to Excess-3 codeconverter and verify its functionality by using gates.
6. Design a BCD to Gray code converter and verify its functionality by using gates.
7. Design and verify the functionality of Decoders and multiplexers of Different inputs.

CYCLE 2:
8. Verify the functionality of following Flip-Flops.
a) SR Flip-Flop
b) JK Flip-Flop
c) D Flip-Flop
d) T Flip-Flop
9(a) Design a UP-Counter using JK/T Flip-Flop.
(b) Design a MOD-3 Counter.
10. Design a Bi-directional Counter using JK/T Flip-Flop.

Experiments beyond the syllabus:
1. Design various types of Shift Registers.
2. Design a Excess-3 to BCD code converter and verify its functionality by using gates.
3. Design a Gray to Binary code converter and verify its functionality by using gates.
4. Design a Gray to BCD code converter and verify its functionality by using gates.
5. Project

B.Tech. (II Sem.)	17ME75 - COMPUTER AIDED ENGINEERING DRAWING LAB	L	T	P	Cr.
		1	-	2	2

Pre-requisites : NIL

COURSE EDUCATIONAL OBJECTIVE:
The main objectives of this course are to familiarize various commands used in Auto-CAD and to visualize the isometric and orthographic views of any solid object.

COURSE OUTCOMES: After completion of the course students are the able to:
CO1:.Apply Auto-CAD basics to solve practical problems used in industries where the speed and accuracy can be achieved.
CO2:Apply the principle of Orthographic projections of points, lines, planes and solids.
CO3: Evaluate their ability in applying various concepts to solve practical problems related to engineering drawing.
CO4:Convert orthographic to isometric vice versa.

At least 10 Exercises are to be conducted using Auto Cad software:

BASIC AUTO CAD COMMANDS:
1. Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).
2. Edit commands (copy, move, erase, zoom).
3. Array commands (polar array, rectangular array, P-edit, divide a line, offset).
4. Hatching &line commands (hatching with different angles& different types of lines).
5. Mirror & trim commands (mirror an object, trim, extend a line, chamfer& fillet, explode).
6. Dimensioning & text commands (linear, angular, radius, diameter& text).

PROJECTION OF POINTS AND LINES:
1. Projection of points (I, II, III, & IV quadrants).
2. Projection of lines parallel to both reference planes.
3. Projection of lines parallel to one reference plane & inclined to other reference plane.

ORTHOGRAPHIC PROJECTIONS:
1. Conversion of plane objects.
2. Conversion of circular objects.
3. Conversion of both combination of plane figures and circular objects.

ISOMETRIC PROJECTIONS:
1. Conversion of plane objects.
2. Conversion of circular objects.
3. Conversion of both combination of plane figures and circular objects.

REFERENCES:
1. M. Kulkarni, A.P Rastogi, and A.K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
2. Bethune, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
3. N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar Publishers, 2012

L	T	P	Cr.
3	2	-	4

B.Tech. (III Sem.) **17FE08 - PROBABILITY AND STATISTICS**

Pre-requisites : None

Course Educational Objective : The objective of this course is to intoduce the probability and its distributions, sampling methods and estimation. They also learn various tests of hypothesis and evaluation of correlation and regression analysis.

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

CO1: Predict various probabilistic situations based on the laws of probability and random variables.
CO2: Distinguish among the criteria of selection and application of Binomial, Poisson, Normal and Exponential distributions.
CO3: Estimate the point and interval estimators of mean and proportion for the given Sample data.
CO4: Apply various sample tests like Z-test, t-test, F-test and χ2-test for decision making regarding the population based on sample data.
CO5: Estimate the level of correlation, the linear relationship using the regression lines for the given bivariate data.

UNIT - I :

PROBABILITY AND RANDOM VARIABLES

Conditional probability – Multiplication theorem-Baye's theorem.
Random variables – Discrete and continuous Random Variables, distribution function. Mathematical Expectation of Univariate Random Variable.

UNIT –II

PROBABILITY DISTRIBUTIONS

Discrete Probability Distributions: Binomial distribution and Poisson distribution. Continuous Probability Distributions: Normal distribution and Exponential distribution. Related properties, simple applications.

UNIT –III

SAMPLING DISRIBUTION AND ESTIMATION

Population and sample, Sampling distribution of mean (with known and unknown variance), and variances. Sampling distribution of sums and differences. Point estimation and interval estimation for mean and proportions.

UNIT –IV

TESTS OF HYPOTHESIS

Null and Alternative Hypothesis, One tail and two tailed tests,Type I and Type II errors. Testing of hypothesis concerning means, proportions and their differences using Z-test. Tests of hypothesis using Student's t-test, F-test and χ^2-test.
Applications of decision making using the above tests.

UNIT –V

CORRELATION AND REGRESSION

Simple Bivariate Correlation: Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient. Linear Regression: Regression lines, Regression coefficients, properties of Regression coefficients.

TEXT BOOKS

1. Miller, Freund, "*Probability and Statistics for Engineers*", 8th edition, PHI, New Delhi, 2011.
2. S.C.Gupta, V.K.Kapoor, "*Fundamentals of Mathematical Statistics*", 11th Edition, Sultan Chand and sons, New Delhi, , 2014.

REFERENCES

1. Jay L. Devore, "*Probability and Statistics for engineering and the sciences*", 8th Edition, Cengage Learning India, New Delhi, 2012.
2. William W. Hines, "*Probability and Statistics in Engineering*", 4th edition, John Wiley and Sons, New Delhi, 2003.
3. T.K.V. Iyangar, "*Probability and Statistics*", 4th revised Edition, S. Chand and Company, New Delhi, 2012.
4. B.V. Ramana, "*Higher Engineering Mathematics*", 1stEdition, TMH, New Delhi, 2010.

L	T	P	Cr.
3	-	-	3

B.Tech. (III Sem.) **17FE03 - ENVIRONMENTAL SCIENCE**

Pre-requisites : None

Course Educational Objective :

To provide a general background on developing an understanding of systems and cycles on the earth and how individual organisms live together in complex communities.

To enable the students in understanding how human activities influence our air, water and soil and it also helps in developing a right attitude about our use of fossil fuels and effect on climate and sustainable management of natural resources.

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

CO1: Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.

CO2: Evaluate local, regional and global environmental issues related to resources and their sustainable management.

CO3: Identify the importance of ecosystem and biodiversity for maintaining ecological balance.

CO4: Acknowledge and prevent the problems related to pollution of air, water and soil.

CO5: Interpret the significance of implementing environmental laws and abatement devices for environmental management.

UNIT – I

Nature and scope of Environmental Problems

- Introduction, components of Environment
- Scope and importance of environmental studies
- Population explosion, variations among nations
- Resettlement and Rehabilitation - Issues and possible solutions
- Environment and human health
- HIV-AIDS
- Environmental ethics
- Role of Information Technology in environmental management and human health

UNIT – II

Natural Resources and Conservation

- Introduction and classification of Natural Resources
- Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, interlinking of rivers, dams-benefits and problems. Rain water harvesting, watershed management
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, soil salinity
- Energy resources: Growing energy needs renewable, non-renewable and alternate energy resources

UNIT – III

Ecology and Biodiversity

- Definition, structure and functions of an ecosystem
- Food chains and Food webs, Ecological succession, Ecological pyramids

- Biogeochemical cycles, Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species
- Definition and levels of measuring biodiversity - genetic, species, community and ecosystem diversity
- Bio geographical classification of India
- India as a mega diversity nation
- Values of biodiversity- Direct and Indirect values
- Threats to biodiversity; Man and wild life conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation methods

UNIT – IV

Environmental Pollution

- Introduction to Environmental Pollution Causes, effects and control measures of:
- Air pollution
- Water pollution
- Soil pollution
- Noise pollution
- Nuclear hazards
- Solid Waste Management – Sources, Classification, effects and control measures of Municipal solid waste, Biomedical waste & Hazardous and e-waste
- Environmental Issues relating to Climate change, global warming, acid rain, ozone layer depletion
- Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.

UNIT – V

Environmental Management

- Sustainable development and unsustainability
- Stockholm and Rio Summit
- Environmental Impact Assessment (EIA)
- Green building
- Consumerism and Waste products
- Carbon credits and carbon trading
- Environmental Law- Air, Water, Wild life, Forest, and Environmental protection act

TEXT BOOKS

1. Anubha Kaushik, C.P.Kaushik, "Perspectives in Environmental Studies", New age international publishers, Delhi, 5nd edition,2016.
2. MahuaBasu, S.Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, Delhi, 1st edition, 2016.

REFERENCES

1. S.Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, Delhi, 2nd Edition, 2014.
2. R. Rajagopalan, "Environmental Studies (From Crisis to Cure)", Oxford University Press, New Delhi, 3rd Edition, 2012.
3. De, A.K, "Environmental Chemistry", New Age International (P) Limited, New Delhi,5th Edition, 2003.
4. Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, Vijayawada, 1st Edition,2010.
5. G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, New Delhi,13th Edition, 2009.

B.Tech. (III Sem.) 17CI03 - DISCRETE MATHEMATICAL STRUCTURES

L	T	P	Cr.
2	2	-	3

Pre-requisites: Basic Mathematical Knowledge

Course Educational Objective:
Perform the operations associated with sets, functions, and relations. Relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior of software or to solve problems such as puzzles.

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

CO1: Outline basic proofs for theorems using the techniques of - direct proofs, example, Proof by contradiction and mathematical induction.
CO2: Illustrate by examples the basic terminology of functions, relations, sets and Demonstrate knowledge of their associated operations.
CO3: Designing Network application, data structures using Graph terminology.
CO4: Apply the graph algorithms for routing and scheduling in different operating systems.
CO5: Construct compilers, error detection code, solve practical applications with the use ofbasic Counting principles of permutations, combinations, inclusion/exclusion principleand the Pigeonhole methodology.

UNIT – I
Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Duality law, Tautological Implications, Normal Forms, Theory ofInference for Statement Calculus, Consistency of Premises, Indirect Method of Proof.
Predicate calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free & Bound Variables, Inference theory for predicate calculus.

UNIT – II
Set Theory: Introduction, Operations on Binary Sets. Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.
Functions:Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions,Recursive Functions.

UNIT - III
Graph Theory I: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: AdjacencyMatrices, Incidence Matrices, Isomorphic Graphs, Eulerian and Hamiltonian Graphs, Multigraphs.
Graph Theory II: Planar Graphs, Euler's Formula, Graph Coloring, ChromaticNumber, Trees, Spanning Trees: Properties, Algorithms for Spanning trees and MinimumSpanning Trees.

UNIT –IV
Algebraic Structures: Algebraic Systems with one Binary Operation, Properties of Binaryoperations, Semi groups and Monoids: Homomorphism of Semi groups and Monoids,Groups: Abelian group, Cosets, Subgroups (Definitions and Examples of all Structures),

Combinatorics: Basic of Counting, Permutations, Permutations with Repetition of Objects,Restricted Permutations, Combinations, Restricted Combinations, Pigeonhole Principle andits Application, Binomial Theorem**,** Binomial and Multinomial Coefficients.

UNIT – V

Recurrence Relation: Generating Function of Sequences, Calculating Coefficient ofGenerating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solvinglinear homogeneous recurrence Relations by substitution, generating functions and TheMethod of Characteristic Roots. Solving Inhomogeneous Recurrence Relations.

TEXT BOOK

Tremblay, Manohar, Discrete Mathematical Structures with Applications to ComputerScience, TMH Publications.

REFERENCES

1. S.Santha, Discrete Mathematics, Cengage
2. Thomas Koshy, Discrete Mathematics with Applications, Elsevier
3. JK Sharma, Macmillan Discrete Mathematics, 2nd edition,
4. Chandrasekaran, Umaparvathi, Discrete Mathematics, PHI, 2010
5. Ralph. P.Grimaldi, Ramana, Discrete and Combinational Mathematics, Pearson, 5thedition.
6. Mott, Kandel, Baker, Discrete Mathematics for Computer Scientists &Mathematicians, PHI, 2/e

B.Tech. (III Sem.)	17CI04 - PYTHON PROGRAMMING	L	T	P	Cr.
		2	2	-	3

Pre-requisites: C Progrpamming

Course Educational Objective:
Python is a Modern Language useful for writing compact codes specifically for Programming in the area of Server-side Web Development, Data Analytics, AI and Scientific Computing as well as Production Tools and Game Programming.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Identify the basic python constructs with a view of using them in problem solving.
CO2: Apply control structures and use python lists in examples of problem solving.
CO3: Explore the utility of strings and functions in modular programming using python.
CO4: Apply tuple, set and file operations to organize the data in real world problems.
CO5: Analyze various searching and sorting techniques using python and apply exception Handling, database operations in python.

UNIT – I (Introduction to Python)
Introduction to Python: History of Python, Usage of Python interpreter, Structure of python Program, Python Shell, Indentation, Python Built-in types, Variables, Assignment, Input-Output Statements, Simple Programs, Identifiers and keywords, Literals.
Operators: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Bitwise operators, Increment & Decrement operators, Python Membership Operators (in & not in), Python Identity Operators (is & is not), Operator precedence.

UNIT – II (Control Structures & Lists)
Control Structures: Conditional Statements - if, if-else, Nested if-else. Jumping Statements - continue, break and pass. Python Loops - while, for, Nested loops with Programming Examples, Mathematical Functions,Constants (import math)ands Random Number Functions.
Python Lists: Concept, Creating and Accessing Elements, Updating & Deleting Lists, basic List Operations, Reverse, Indexing, Slicing and Matrices, Built-in List Functions.

UNIT – III (Strings & Functions)
Python strings: Concept, Slicing, Escape characters, String Special Operations, String formatting Operator, Triple Quotes, Raw String, Unicode Strings and Built-in String methods.
Functions: Defining a Function, Calling a Function, Types of Functions, Function Arguments, Anonymous functions, Global and Local Variables, Recursion.

UNIT – IV (Tuples, Sets & Files)
Python Tuples - Introduction, Creating & Deleting Tuples, Accessing values in a Tuple, Updating tuples, Delete Tuple Elements, basic Tuple Operations, Indexing, Slicing and Matrices, built- in tuple Functions. **Sets** - Concept, Operations. **Files:** Creating files, Operations on Files (open, close, read, write).

UNIT – V (Searching & sorting, Exception Handling and Database)
Searching and sorting: Searching Techniques – Linear Search and Binary Search. Sorting Techniques – Bubble Sort, Selection Sort, Insertion Sort, Merge Sort and Heap Sort.
Exception Handling: Exception, Exception Handling, except clause, Try? finally clause, User Defined Exceptions.
Database: Introduction, Connections, Executing queries, Transactions, errorhandling

TEXT BOOKS

1. PovelSolin, Martin Novak, "Introduction to Python Programming", NC Lab Public Computing, 2013.
2. Bill Lubanovic, "Introducing Python- Modern Computing in Simple Packages", O'Reilly Publication, 1st Edition, 2015.

REFERENCES

1. Jacob Fredslund, ". Introduction to Python Programming", 2007.
2. Y.Daniel Liang, "Introduction to programming using python", Pearson, 2013.
3. R. Nageswara Rao, "Core python programming", Dreamtech, 2017.
4. Mark Summerfield, "Programming in Python 3" Pearson Education, 2nd Edition, 2010.
5. Magnus Lie Hetland, "Beginning Python –From Novice to Professional", APress Publication, 3rdEdition, 2017

L	T	P	Cr.
2	2	-	3

B.Tech. (III Sem.) **17CI05 - DATA STRUCTURES**

Pre-requisites:C LANGUAGE

Course Educational Objective: To make students familiar with:
Writing algorithms to implement operations involved in different data structures like linked list & different types of trees and Implement various searching and sorting techniques.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Compare normal data type with abstract data type (ADT), explore the sections of ADT. Analyse example programs with data structures using analysing tools.
CO2: Develop &analyse the algorithms for stack and queue operations leading to applications.
CO3: Analyse, implement and compare searching and sorting Techniques.
CO4: Design &analyse algorithms for operations on Binary Search Trees & AVL Trees data structures.
CO5: Evaluate Graph traversal and minimum cost spanning tree algorithms and compare hashing methods on hash table data structure.

UNIT – I
Algorithm Analysis:
Mathematical Background, Model, Analysis and Run Time Calculations, Lists: Abstract Data Types, List using arrays and pointers, Singly Linked, Doubly Linked, Circular Linked Lists, Polynomial ADT.

UNIT – II
Stacks: The Stack: Definition, operations, implementation using arrays, linked list and Stack Applications: Infix to postfix expression conversion, Evaluation of Postfix expressions, Balancing the symbols. Queue: definition, operations, implementation using arrays, linked List&it'sApplications.Circular queue: definition its operations, implementation, DE queue: Definition& its types, implementation

UNIT – III
Searching: Linear, Binary & Fibonacci searching
Sorting: Bubble sort, Insertion Sort, Merge Sort, Quick Sort & Heap Sort

UNIT – IV
Trees: Terminology, Binary Trees: definition, types of binary trees, Representation, Implementation (linked list), Tree traversals: Recursive techniques, Expression Tress, Search Tree: Binary Search Tree-Search, Insert, Deletion (all the three cases), Balanced Tree – Introduction to AVL tree and Rotations

UNIT – V
Graphs: Fundamentals, Representation of graphs, Graph Traversals: BFS, DFS.
MinimumCost spanning tree: Definition, Prim's Algorithm, Kruskal's algorithm.
Hashing: Hash Table, Hash Function, Collision resolution Techniques- separate Chaining, Open addressing, rehashing.

TEXT BOOKS

1 Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd edition.
2. ReemaThareja, Data Structures using c, Oxford Publications.

REFERENCES

1. Langson, Augenstein&Tenenbaum, 'Data Structures using C and C++', 2nd Ed, PHI.
2. RobertL.Kruse, Leung and Tando, 'Data Structures and Program Design in C', 2ndedition, PHI.

B.Tech. (III Sem.)	17CI06 - COMPUTER ARCHITECTURE	L	T	P	Cr.
		2	2	-	3

Pre-requisites: Digital Logic Design

Course Educational Objective:

Understand the basic functional modules of a computer system and their interconnection mechanism. Understand the data path and control path organization in a general purpose CPU. Get the design knowledge of main memory and cache memory systems. Explore the methods of communication between CPU and I/O devices. A case study on standard I/O interfaces.

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

CO1: Identify the sequence of micro operations in the execution of one macro instruction and thereby gain the concepts of control steps, Instruction cycle, Register structure of CPU, Types of micro operations and RTL.
CO2: Analyze the internal organization of CPU for performing Integer Arithmetic, Floating point Arithmetic and logical operations.
CO3: Understand the features of hardwired and micro programmed control units leading to the comparative study of control path organization in these types.
CO4: Analyze the memory hierarchy system and performance improvement by cache memory organization and its principles.
CO5: Analyze the communication methods of I/O devices and standard I/O interfaces.

UNIT – I
Basic Computer Organization and Design: Block Diagram of a Computer, Basic Functional Units of a Computer, Computer Architecture Models-Von Neumann Architecture and Harvard Architecture, Internal Organization of a Central Processing Unit, Register Structure, Introduction to Sequence of Micro operations in the process of one instruction execution, Introduction to Control steps and Register Transfer language, Classification of Micro operations- Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Instruction cycle, Instruction Set, Basic Computer Instructions.

UNIT – II
Central Processing Unit: Instruction formats, Addressing modes, Data Transfer and Manipulation Instructions, Logical Instructions, Program control Instructions,
Data Representation: Fixed Point Representation, Floating Point Representation. Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic operations.

UNIT – III
Control Unit: Control Memory, Hard wired control, Micro programmed control and Micro Instruction Format, Address Sequencing, Design of Control Unit.

UNIT – IV
Memory Organization: Memory Hierarchy, Primary Memory, Introduction to Secondary Memory, Associative Memory, Cache Memory.

UNIT – V

Input-Output Organization: Peripheral Devices, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input Output Processor.

Standard Input Output Interfaces: Input Output Interface, Synchronous data transfer, Asynchronous Data Transfer, Timing diagrams for Synchronous and Asynchronous data transfers, Serial communication.

TEXT BOOKS

1. M.Morris Mano, "Computer Systems Architecture", Pearson Education publishers, 3rd edition, 1992.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", TMH publications, 5th edition, 2002.

REFERENCES

1. William Stallings, "Computer Organization and Architecture", Pearson/PHI publishers, 6th edition, 2004.
2. Andrew S. Tanenbaum, "Structured Computer Organization", Pearson/PHI publishers, 4th edition, 2005.
3. Sivarama P. Dandamudi, "Fundamentals or Computer Organization and Design", Springer publishers, 1st edition, 2003.
4. John D Carpinelli, "Computer Systems Organization and Architecture", Pearson Education, 1st edition, 2001.

B.Tech. (III Sem.)	17FE66 - STATISTICAL PROGRAMMING WITH R LAB	L	T	P	Cr.
		-	-	2	1

Prerequisites: Basics of Mathematics

Course Objective

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

CO1: Apply the different distributions
CO2: Use statistical tests in testing hypotheses on data
CO3: Describe the properties of discrete and continuous distribution functions

Syllabus

Cycle1: Introduction to R Programming

Cycle 2: Getting Used to R: Describing Data

- Viewing and Manipulating Data
- Plotting Data
- Reading in Your Own Data

Cycle 3: Visualizing Data

- Tables, charts and plots. Visualising Measures of Central Tendency, Variation, and Shape. Box plots, Pareto diagrams. How to find the mean median standard deviation and quantiles of a set of observations.
- Students may experiment with real as well as artificial data sets.

Cycle 4: Probability Distributions.

- Generate and Visualize Discrete and continuous distributions using the statistical environment. Demonstration of CDF and PDF uniform and normal, binomial Poisson distributions.
- Students are expected to generate artificial data using and explore various distribution and its properties. Various parameter changes may be studied.

Cycle 5: Densities of Random Variables

- Off the Shelf Distributions in R
- Matching a Density to Data
- More About Making Histograms

Cycle 6: Binomial Distribution

- Study of binomial distribution. Plots of density and distribution functions. Normal approximation to the Binomial distribution.

Cycle 7: Building Confidence in Confidence Intervals

- Populations Versus Samples
- Large Sample Confidence Intervals
- Simulating Data Sets
- Evaluating the Coverage of Confidence Intervals

Cycle 8: Perform Tests of Hypotheses

- How to perform tests of hypotheses about the mean when the variance is known. How to compute the p-value. Explore the connection between the critical region, the test statistic, and the p-value

Cycle 9: Correlation

- How to calculate the correlation between two variables. How to make scatter plots. Use the scatter plot to investigate the relationship between two variables

Cycle 10 : Estimating a Linear Relationship

- A Statistical Model for a Linear Relationship
- Least Squares Estimates
- The R Function lm
- Scrutinizing the Residuals

TEXTBOOK:

1. Maria Dolores Ugarte , Ana F. Militino , Alan T. Arnholt "Probability and Statistics with R" 2nd Edition on, CRC Press, 2016.

REFERENCES:

1. Michael Akritas, "Probability & Statistics with R for Engineers and Scientists", 2nd Edition on, CRC Press, 2016.

Web Links

1. http://nptel.ac.in/courses/106104135/48

2. http://nptel.ac.in/courses/110106064/

L	T	P	Cr.
-	-	2	1

B.Tech. (III Sem.) **17CI62 - PYTHON PROGRAMMING LAB**

Pre-requisites: Programming languages like CGI, C Language.

Course Educational Objective: This Python course leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, sets, working with binary data, and using the extensive functionality of Python modules. Extra emphasis is placed on features unique to Python, such as tuples, array slices, and output formatting.

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

CO1: Identifyvarious data structures available in Python and apply them in solving computational problems.
CO2: Design and implement programs to process data.
CO3: Explore the usage of exception handling and database interaction.

Lab Exercises

I. Exercise programs on basic control structures & loops

a) Write a program for checking the given number is even or odd.
b) Using a for loop, write a program that prints the decimal equivalents of 1/2, 1/3, 1/4,...1/10
c) Write a program for displaying reversal of a number.
d) Write a program for finding biggest number among 3 numbers.
e) Write a program using a while loop that asks the user for a number and prints a countdown from that number to zero.

II.Exercise programs on operators & I/O operations.

a) Write a program that takes 2 numbers as command line arguments and prints its sum.
b) Implement python script to show the usage of various operators available in python language.
c) Implement python script to read person's age from keyboard and display whether person is eligible for voting or not.
d) Implement python script to check the given year is leap year or not.

III. Exercise programs on Python Script

a) Implement Python Script to generate first N natural numbers.
b) Implement Python Script to check given number is palindrome or not.
c) Implement Python script to print factorial of a number.
d) Implement Python Script to print sum of N natural numbers.
e) Implement Python Script to check given number is Armstrong or not.
f) Implement Python Script to generate prime numbers series up to n.

IV.Exercise programs on Lists

a) Finding the sum and average of given numbers using lists.
b) To display elements of list in reverse order.
c) Finding the minimum and maximum elements in the lists.

V.Exercise programs on Strings

a) Implement Python Script to perform various operations on string using string libraries.
b) Implement Python Script to check given string is palindrome or not.
c) Implement python script to accept line of text and find the number of characters, number of

vowels and number of blank spaces in it.

VI. Exercise programs on functions.

a) Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.

b) Write a program which makes use of function to display all such numbers which are divisible by7 but are not a multiple of 5, between 1000 and 2000.

VII. Exercise programs on recursion & parameter passing techniques.

a) Define a function which generates Fibonacci series up to n numbers.

b) Define a function that checks whether the given number is Armstrong

c) Implement a python script for Call-by-value and Call-by-reference

d) Implement a python script for factorial of number by using recursion.

IX. Exercise programs on Tuples

a) Write a program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple which contains every number. Suppose the following input is supplied to the program:34,67,55,33,12,98. Then, the output should be: ['34', '67', '55', '33', '12', '98'] ('34',67', '55', '33', '12', '98').

b) With a given tuple (1,2,3,4,5,6,7,8,9,10), write a program to print the first half values in one line and the last half values in one line.

X. Exercise programs on files

a) Write Python script to display file contents.

b) Write Python script to copy file contents from one file to another.

XI. Exercise programs on searching & sorting Techniques.

a) Implement a python script to check the element is in the list or not by using Linear search & Binary search.

b) Implement a python script to arrange the elements in sorted order using Bubble, Selection, Insertion and Merge sorting techniques.

XII. Exercise programs on Exception handling concepts

a) Write a python program by using exception handling mechanism.

b) Write a python program to perform various database operations (create, insert, delete, update).

L	T	P	Cr.
--	--	2	1

B.Tech. (III Sem.) **17CI63 – DATA STRUCTURES LAB**

Pre-requisites: Computer Programming

Course Educational Objective: This course content enables students to:
Write and implement algorithms of different data structures like Lists, Stacks, Queues and Trees.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Implement & test the performance of data structures like linked list, stacks, queues.
CO2: Implement & test the performance of searching and sorting techniques.
CO3: Implement & test the performance of trees and graph traversal techniques.

Lab Exercises

I) Exercise programs on List ADT:

a) Write a C program to implement various operations on List using arrays.
b) Write a C program to implement various operations on Single linked List using pointers.
c) Write an interactive C program to create a linear linked list of customer names and their telephone numbers. The program should be menu-driven and include features for adding a new customer, deleting an existing customer and for displaying the list of all customers.
d) Write a C program to create a circular linked list so that the input order of data items is maintained. Add the following functions to carry out the following operations on circular single linked lists. a) Count the number of nodes. b) insert a node c) delete a node
e) Write a C program that will remove a specified node from a given doubly linked list and insert it at the end of the list on an existing list. Also write a function to display the contents of the list.

II) **Exercise programs on Stack & Queue ADT**:

a) Write a C program to implement a stack using array &linked list in which Push, Pop and display can be performed.
b) Write a program to convert infix expression to post fix expressions using array implementation of stack
c) Write a program for evaluating postfix expressions using array implementation of stack
d) Write a C program to implement a queue using arrays and linked list in which insertions, deletions and display can be performed.

III) **Exercise programs on Searching Techniques**:

a. Write a C program to implement Linear Search.
b. Write a C program to implement Binary Search.
c. Write a C program to implement Fibonacci Search.

IV) **Exercise Programs on Sorting Techniques:**

a) Write a C program to implement insertion sort& Bubble sort
b) Write a C program to implement Quick sort.
c) Write a C Program to implement Merge Sort
d) Write a C program to Heap sort

V) **Exercise Programs on Binary & Binary Search Trees:**

a) Write a C program to construct a binary tree and do inorder, preorder and post order traversals, printing the sequence of nodes visited in each case.

b) Write a C program to implement BST operations- insertion, search and deletion**.**

VI) Exercise Programs on Graphs:

a) Write a C program to implement the following graph Traversals a) DFS b) BFS

Contents beyond Syllabus:

a) Write a C program to implement Circular Double Linked List.
b) Write a C program to implement Radix Sort.
c) Write a C program to reverse double linked list.
d) Write a C program to implement Shell Sort.
e) Write a C program to implement Hash table with separate chaining.

B.Tech. (IV Sem.)	17FE11 - LINEAR ALGEBRA AND NUMERICAL APPLICATIONS	L	T	P	Cr.
		3	2	-	4

Pre-requisites: Basics of Matrix Algebra

Course Educational Objective : The objective of this course is to introduce the Matrix Algebra. The students will also gain the knowledge of numerical techniques for solving the equations and fitting of various curves.

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

CO1: Distinguish among the pros and cons between the Row operation methods and Iterative methods in solving system of linear equations.

CO2: Compute the Eigen values and Eigen vectors, powersand Inverse of a square matrix through Cayley – Hamilton theorem.

CO3: Reducing the given matrix into Diagonal form using various transformations and Transforming the Quadratic form into canonical form and identify its nature

CO4: Application of numerical techniques for algebraic and transcendental equations.

CO5: Use numerical methods for the solution of the linear system of equations and estimate the unknown dependent variables using curve fitting methods

UNIT –I

System of Linear Equations.

Matrices - Rank- Echelon form, Normal form, PAQ form– Solution of Linear Systems – Homogeneous system of equations and Non Homogeneous system of equations.

UNIT –II

Eigen Values and Eigen Vectors

Eigen values – Eigen Vectors – Properties – Cayley Hamilton Theorem – Inverse and Powers of a matrix by using Cayley Hamilton Theorem.

UNIT –III

Linear Transformation and Diagonalization

Linear transformation and orthogonal transformation of matrices, Similarity of matrices, Diagonalization of a matrix and orthogonal reduction of real symmetric matrices.

Quadratic forms

Quadratic forms – Reduction of quadratic forms to canonical form – Rank- Positive, Negative, Definite- Semi definite- index, signature.

UNIT – IV

Solution of Algebraic and Transcendental Equations

Solutions of Algebraic and Transcendental Equations – Regula Falsi method, Newton Raphson Method in one variable.

Interpolation and Finite Differences

Interpolation: Introduction – Finite differences- Forward Differences- Backward Differences-Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Lagrange's Interpolation formula.

UNIT – V

Numerical Solution of Linear system of equations

Solution of linear systems – Gauss - Seidal method and Gauss Jacobi Method. Determination of eigen values by iteration.

CURVE FITTING

Curve fitting by the principle of Least Squares: Fitting of a straight line – Second degree parabola-other polynomial curves-Fitting of exponential curves –Fitting of a power curve

TEXT BOOKS

1. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH Publications, New Delhi, 2010.

REFERENCES

1. M. D. Greenberg, "*Advanced Engineering Mathematics*", 2nd Edition, TMH Publications, New Delhi, 2011.
2. Erwin Kreyszig, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley &Sons, New Delhi, 2011.
3. W. E. Boyce and R. C. Diprima, "*Elementary Differential equations*", 7th Edition, John Wiley and sons, New Delhi, 2001.

B.Tech. (IV Sem.)	17CI07 - OOPS THROUGH JAVA	L	T	P	Cr.
		3	-	-	3

Pre-requisites: C, C++.

Course Educational Objective: Concentrates on the methodological and technical aspects of software design and Programming based on OOP. Acquire the basic knowledge and skills necessary to implement object-oriented Programming techniques in software development through JAVA. Know about the importance of GUI based applications and the development of those Applications through JAVA. Get sufficient knowledge to enter the job market related to Web development.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Identify Object Oriented concepts through constructs of JAVA.
CO2: Analyze the role of Inheritance, Polymorphism and implement Packages, Interfaces in Program design using JAVA.
CO3: Explore Exception handling and Multi-threading concepts in program design using JAVA.
CO4: Develop GUI based applications using Applet class and explore the concept of Event Handling using JAVA.
CO5: Design some examples of GUI based applications using AWT controls and Swings.

UNIT – I
Introduction: Drawbacks of POP, Object Oriented paradigm, OOP concepts.
Java Language: History of Java, Java Buzzwords, The Byte code, Simple types, Arrays, Type conversion and casting, simple java programs.
Introducing classes: Class fundamentals, declaring objects, access control and recursion, Constructors, garbage collection, Simple example programs of String and StringBuffer classes, Wrapper classes.

UNIT – II
Inheritance &Polymorphism: Inheritance basics, using super keyword, multilevel hierarchy, Method overloading, Method overriding, Dynamic method dispatch, abstract class, Object class and final keyword.
Packages: Defining a package, Accessing a Package, Understanding CLASSPATH, importing packages, exploring java.util package (StringTokenizer, date classes).
Interfaces: Defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Differences between classes and interfaces.

UNIT – III
Exception handling:Exception handling fundamentals, exception types, usage of try& catch, throw, throws and finally, Java Built-in Exceptions.
Multithreading: Differences between multi-threading and multitasking, java thread model, Creating thread, multiple threads and synchronizing threads.

UNIT – IV
Applet Class: Concepts of Applets, differences between applets and applications, applet architecture, skeleton, creating applets, passing parameters to applets, working with Graphicsclass.
Event Handling: Events handling mechanisms, Events, Event sources, Event classes, Event Listeners interfaces, Delegation event model, handling mouse and keyboard events, Adapterclasses, Inner classes.

UNIT – V

AWT controls: label, button, scrollbars, text components, check box, check box groups, Choices controls, lists, scrollbar, text field, layout managers – border, grid, flow.

Introducing Swing:– Introduction, key features of swings, limitations of AWT, components &containers, swing packages, creating swing applet- JApplet class, JComponents- Labels, text fields, buttons – The JButton class, Tabbed Panes, Scroll Panes, Tables.

TEXT BOOKS

Herbert Schildt, "Java: The complete reference", TMH Publications, 7th edition, 2006.

REFERENCES

1. Dr.R.NageswaraRao,"Core JAVA: An Integrated Approach", Dreamtech Press, 1st Edition, 2008.
2. E. Balaguruswamy, "Programming with JAVA", TMH Publications, 2ndEdition, 2000.
3. Patrick Niemeyer & Jonathan Knudsen, "Learning Java", O'REILLY Publications, 3rd Edition, 2005.
4. Benjamin J Evans & David Flanagan,"Java–in a Nutshell – A desktop quick reference", O'REILLY Publications, 6th Edition, 2014.
5. David Flanagan, "Java Examples In a nutshell – A Tutorial companion to java in a nutshell", O'REILLY Publications, 3rd Edition, 2004.

B.Tech. (IV Sem.) 17CI08 - DESIGN AND ANALYSIS OF ALGORITHMS

L	T	P	Cr.
3	-	-	3

Pre-requisites: Knowledge of Programming, Discrete Mathematics and Data Structures.

Course Educational Objectives:

Students undergoing this course are expected to:

Identify the fundamental concepts of various algorithm design techniques. Make the students familiar to conduct performance evaluation of algorithms. Expertise the students with the various existing algorithm design techniques. Motivate the students to design new algorithms for various problems.

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

CO1: Identify the basic properties and analysis methods of algorithms and design divide and conquer paradigm for solving a few example problems and analyze them.

CO2: Design Greedy algorithms for knapsack problem, minimum cost spanning tree,single source shortest path problem and analyze them.

CO3: Apply dynamic programming paradigm to solve travelling sales person problem,0/1 knapsack problem,Optimal binary search tree.

CO4: Apply Backtracking search methods on state space trees for few example problems.

CO5: Analyse branch and Bound search methods through problems such as 0/1 knapsack problem,Travelling sales personn problem.

UNIT - I

Introduction: Algorithm definition, Specifications, Performance Analysis- Time Complexity, SpaceComplexity. Asymptotic Notations-Big-Oh, Omega, Theta. **Divide and Conquer:** General Method, Binary Search, Finding Maximum and Minimum, Merge Sort, Quick sort.

UNIT - II

The Greedy Method – General Method, Knapsack Problem, Job sequencing with deadlines, Minimum-cost spanning trees, Optimal storage on tapes, Optimal merge pattern, Single source shortest paths.

UNIT - III

Dynamic Programming - General method, Multistage graph, All pairs shortest path, Single Source Shortest path, Optimal Binary search trees, 0/1 Knapsack, Reliability design, the traveling salesman problem.

UNIT - IV

Back tracking - The General Method, The 8-Queens Problem, Sum of subsets, Graph Colouring, Hamiltonian cycles.

UNIT-V

Branch and Bound – General method, Travelling salesperson Problem, 0/1 Knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

TEXT BOOKS

Ellis Horowitz, SartajSahni, "**Fundamentals of Computer Algorithms"**, Galgotia Publications

REFERENCES

1. Mark Allen Weiss, "**Data Structures and Algorithm Analysis in C++**", Pearson, 3/e , 2007.
2. Aho, Hopcroft & Ullman, "**The Design and Analysis of Computer Algorithms",** Addison Wesley publications.
3. Thomas H.Corman et al, "**Introduction to Algorithms",** PHI.
4. Anany Levitin, "**Introduction to the Design and Analysis of Algorithms**", PEA
5. P. H. Dave, H. B. Dave, "**Design and Analysis of Algorithms**", Pearson Education, 2008.

B.Tech. (IV Sem.) **17CS01 - LINUX PROGRAMMING**

L	T	P	Cr.
3	-	-	3

Pre-requisites: Knowledge in Operating Systems

Course Educational Objective: Introduce the student to Linux kernel programming techniques. Review basic concepts covered in the core Operating Systems course prerequisite as they are realized in the Linux platform. Discuss the Process, Inter-Process Communication Techniques and Network Implementation in Linux.

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

CO1: Explore LINUX Ecosystem.
CO2: Implement Shell scripting in LINUX Kernel.
CO3: Design AWK scripts for text processing and Apply Regular Expressions for Pattern Matching.
CO4: Design Scripts for Process Creation & Network Management.
CO5: Analyze multi-processing in Linux kernel.

UNIT – I

Introduction to LINUX: Operating System concepts, Introduction to LINUX, Features of LINUX, LINUX Kernel, Terminal and shell.

Introduction to LINUX File System: The LINUX file System, File System Hierarchy, File system and inodes, File Attributes, File Permissions.

LINUX Commands: man, echo, script, pwd, passwd, who, uname, date, sty, telnet, rlogin, ftp, more, printf, PATH, SU, ps, arp, mkdir, cd, rmdir, ls, cp, rm, mv, cat, wc, lp, od, ln, df, du, locate, tar, zip, chmod, unmask, mount, unmount, ulimit.

UNIT – II

Introduction to Shell: Shell responsibilities, running a shell script, Pipes, Redirection, Command Substitution.

Shell Programming: VI Editor, the shell as a programming Language, Shell Meta Characters, Shell Variables, Shell Commands, Control Structures, Shell Script Examples.

UNIT – III

Filters: simple filters and commands: pr, cmp, comm., ulink, diff, head, tail, find, cut, paste, sort, uniq, tr, w, finger.

Regular Expressions: grep, egrep, fgrep, Sed- line addressing, context addressing, text editing, substitution.

Programming with awk: awk statements, variables and expressions, comparison and logical operators, Begin and End sections, decision and looping statements.

UNIT – IV

The Process: Process concept, Process Creation Mechanism, process attributes.

LINUX Internal: LINUX Kernel Structure, System Calls, Signals, Memory Management.

Network Implementation: TCP Sockets- socket, connect, listen, read, write, accept, fork, UDP-sockets, sendto, recvfrom functions.

UNIT – V

Multi-Processing: The intel multi-processor specification, problems with multi-processor systems, changes to the kernel, compiling LINUX SMP.

TEXT BOOKS

1. Sumitabha Das., Your "Unix The Ultimate Guide", TMH Publications, 2001.
2. M.G. Venkatesh Murthy, "Introduction to UNIX & SHELL programming" , Pearson Education, First Edition, New Delhi, 2009.

REFERENCES

1. B.A. Forouzan& R.F. Giberg, "Unix and shell Programming", Thomson, First Edition, New Delhi, 2003.
2. E. Foster – Johnson & others, "Beginning shell scripting", John Wiley & sons, First Edition, New Delhi, 2008.
3. Sumitabha Das, "Unix concepts and applications", TMH Publications, 4th Edition,.
4. Gaham Glass & K. Ables, Unix for programmers and users, pearson education,3rdedition,.

B.Tech. (IV Sem.) **17CI09 - DATA BASE MANAGEMENT SYSTEMS**

L	T	P	Cr.
2	2	-	3

Pre-requisites:
Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, graphs, dictionaries)& File Concepts.

Course Educational Objective: This course enables the students to know about Basic concepts of DBMS, Database Languages, Database Design, Normalization Process, Transaction Processing, and Indexing.

Course Outcomes: At the end of the course, the student will be able to :
CO1: Outline the components of DBMS & design database using ER model
CO2: Construct database using SQL and extract data from database using Relational algebra & SQL queries
CO3: Apply the normalization process for effective database design
CO4: Analyze components of transaction processing, Concurrency control mechanisms and recovery strategies of DBMS
CO5: Evaluate different File organization & Indexing Techniques

UNIT – I
Introduction: An overview of Database Management System, Database System Vs File System, Database System Concepts and Three Schema Architecture, Data Models, Database Schema and Instances, Data Independence, Database Languages, Database Structure.
Data Modeling using the Entity Relationship Model: ER model concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER model, Relationships of Higher Degree.

UNIT – II
Relational Data Model and Language: Relational Data Model Concepts, Integrity Constraints: Entity Integrity, Referential Integrity, Key Constraints, Domain Constraints, and Relational Algebra.
Introduction to SQL: Characteristics of SQL, Advantage of SQL. SQL Data types and Literals, Types of SQL Commands, Insert, Update and Delete Operations, Tables, Views and Indexes, Nested Queries, Aggregate Functions, Joins, Unions, Intersection, Minus, Cursors in SQL.

UNIT – III
Normalization: Functional Dependencies, Normal Forms - First, Second, Third Normal Forms, BCNF, Inclusion Dependences, Loss Less Join Decompositions, Multi Valued Dependencies, Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT – IV
Transaction Processing Concepts*:* Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializability, Recoverability, Deadlock Handling.
Concurrency Control Techniques: Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Recovery with Concurrent Transactions.
Crash Recovery: Log Based Recovery, Checkpoints, ARIES Algorithm.

UNIT – V

Storage and Indexing: RAID Levels, Page Formats, Record Formats, File Types and Comparison of Different File Organizations, B-tree Indexing, B+-tree Indexing, Hashing – Static, Linear & Extendible hashing

TEXT BOOKS

1. Henry F. Korth, Abraham Silberschatz, S.Sudarshan, "Database System Concepts", McGraw Hill, 6th edition, 2009.
2. RamezElmasri, ShamkanthB.Navathe, "Fundamentals of Database Systems", Addison Wesley, 6th edition, 2010.

REFERENCES

1. Raghu Ramakrishnan, JohanneseGehrke, "Database Management System", McGraw Hill, 3rd edition, 2000.
2. Date C J, "An Introduction to Database System", Pearson Education, 8th edition, 2003.
3. SharadMaheshwari, Ruchin Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi,2005

B.Tech. (IV Sem.) **17CI10 - SOFTWARE ENGINEERING**

L	T	P	Cr.
3	-	-	3

Pre-requisites: concepts of programming and Database Management Systems.

Course Educational Objective: An understanding of different software processes and how to choose between them. How to understand requirements from a client and specify them. Design in the large, including principled choice of software architecture, the use of modules and interfaces to enable separate development, and design patterns. Knowing various quality assurance techniques, including unit testing, integration testing and functional testing.

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

CO1: Outline the fundamentals of software engineering concepts and software process standards.
CO2: Demonstrate appropriate process model and software engineering practices.
CO3: Analyze requirements of software system and explore all requirements gathering approaches.
CO4: Creating an architectural design using design engineering process.
CO5: Apply software testing strategies and software testing tactics for testing real time projects Effectively.

UNIT – I

Introduction to software engineering: The evolving role of Software, software, changing nature of software, legacy software, software myths.
Software process: layered technology, process frame work, CMMI, process patterns, assessment, personal and team process models, process technology, product and process.

UNIT – II

Process models: Prescriptive models, water fall model, incremental, evolutionary and specialized process models, unified process.
Software engineering practice: communication practices, planning practices, modelling practices, construction practice and deployment.

UNIT – III

Requirements Engineering: A bridge to design and construction, RE tasks, initiating the RE process, Eliciting Requirements, developing use cases, building the analysis models, negotiating and validating requirements.
Building the analysis model: requirements analysis, analysis modelling approaches, data modelling concepts, OOA, scenario-based modelling, flow-oriented modelling, class-based modelling, creating a behaviour model.

UNIT – IV

Design Engineering: Design within the context of software engineering, design process and software quality, design concepts, design model, pattern based software design.
Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design.

UNIT – V

Testing Strategies: A strategic to software testing, strategic issues, test strategies for conventional software, object oriented software, validation testing, system testing, the art of debugging.

Testing tactics: software testing fundamentals, white-box testing: basis path testing, control structure testing. Black- box testing, OO-testing methods.

TEXT BOOKS

Roger S. Pressman, "Software engineering- A practitioner's Approach", TMH International Edition, 6th edition, 2005.

REFERENCES

1. Ian Sommerville, Software engineering, Pearson education, 8th edition, 2008.
2. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.
3. Stephan Schach, Software Engineering, TMH Publications, 2007.
4. Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson education, 2001,1995, PHI,2nd edition

B.Tech. (IV Sem.) 17CI64 - DATABASE MANAGEMENT SYSTEMS LAB

L	T	P	Cr.
-	-	2	1

Pre-requisites: Elementary set theory, concepts of relations and functions.
Course Educational Objective: The major objective of this lab is to provide a strong formal foundation in database concepts, technology and practice to the participants to groom them into well-informed database application developers.

Course Outcomes: At the end of the course, the student will be able to:
CO1 : Design & implement a database schema for a given problem-domain.
CO2 : Create database using SQL and implement various integrity constraints.
CO3 :Apply PL/SQL Programming for problem solving.

CYCLE-1

1) Create a table **STUDENT** with appropriate data types and perform the following queries. Attributes are Roll number, student name, date of birth, branch and year of study.

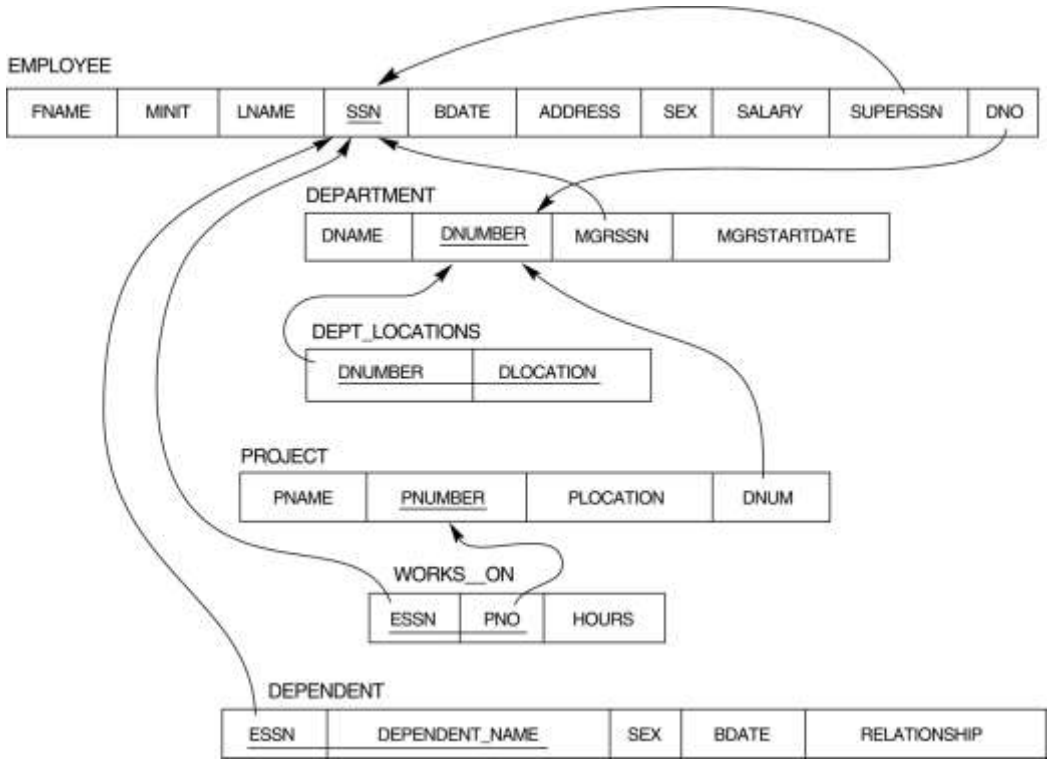
a) Insert 5 to 10 rows in a table?
b) List all the students of all branches
c) List student names whose name starts with 's'
d) List student names whose name contains 's' as third literal
e) List student names whose contains two 's' anywhere in the name
f) List students whose branch is NULL
g) List students of CSE & ECE who born after 1980
h) List all students in reverse order of their names
i) Delete students of any branch whose name starts with 's'
j) Update the branch of CSE students to ECE
k) Display student name padded with '*' after the name of all the students

2) Create the following tables based on the above Schema Diagram with appropriate data types and constraints and perform the following queries.

SAILORS (Saild, Salname, Rating, Age)
RESERVES (Sailid, boatid, Day)
BOATS (Boatid, Boat-name, Color)

a) Insert 5 to 10 rows in all tables?
b) Find the name of sailors who reserved boat number 3.
c) Find the name of sailors who reserved green boat.
d) Find the colors of boats reserved by "Ramesh".
e) Find the names of sailors who have reserved atleast one boat.
f) Find the all sailid of sailors who have a rating of 10 or have reserved boated 104.
g) Find the Sailid's of sailors with age over 20 who have not registered a red boat.
h) Find the names of sailors who have reserved a red or green boat.
i) Find sailors whose rating is better than some sailor called 'Salvador'.
j) Find the names of sailors who are older than the oldest sailor with a rating of 10.

3) Schema Diagram for the rest of the SQL and PLSQL Programs.



Create the following tables based on the above Schema Diagram with appropriate data types and constraints.

EMPLOYEE(Fname, Mname, Lname, SSN, Bdate, Address, Gender, Salary, SuperSSN, Dno)

DEPARTMENT (Dnumber, Dname, MgrSSN, Mgrstartdate)

DEPENDENT (ESSN, Dependent_Name, Gender, Bdate, Relationship)

a) Insert 5 to 10 rows into all the tables.
b) Display all employees' names along with their department names.
c) Display all employees' names along with their dependent details.
d) Display name and address of all employees who work for 'ECE' department.
e) List the names of all employees with two or more dependents.
f) List the names of employee who have no dependents.
g) List the names of employees who have at least one dependent.
h) List the names of the employees along with names of their supervisors using aliases.
i) Display name of the department and name of manager for all the departments.
j) Display the name of each employee who has a dependent with the same first name and gender as the employee.
k)List the names of managers who have at least one dependent.
l) Display the sum of all employees' salaries as well as maximum, minimum and average salary in the entire departments department wise if the department has more than two employees.
m) List the departments of each female employee along with her name.
n) List all employee names and also the name of the department they manage if they happen to manage a dept.
o) Display the name of the employee and his / her supervisor's name.

4) Create the following tables based on the above Schema Diagram with appropriate data types and constraints in addition to the tables in Experiment 2.

DEPT_LOCATIONS (Dnumber, Dloaction)
PROJECT (Pname, Pnumber, Plocation, Dnum)
WORKS_ON (ESSN, Pno, Hours)

a) Insert 5 to 10 rows into all the tables.
b) Find the names of the employees who work on all the projects controlled by the department 'ECM'.
c) List the project number, name and no. Of employees who work on that project for all the projects.
d) List the names of all the projects controlled by the departments department wise.
e) Retrieve the names of employees who work on all projects that 'John' works on.
f) List the project numbers for projects that involve an employee either as worker or as a manager of the department that controls the project.
g) List the names of all employees in one department who work more than 10 hours on one specific project.
h) For each project, list the project name and total hours (by all employees) spent on that project.
i) Retrieve the names of all employees who work on every project.
j) Retrieve the names of all employees who do not work on any project.
k) Display the name and total no. of hours worked by an employee who is working on maximum no. of projects among all the employees.
l) Display the names of all employees and also no. of hours, project names that they work on if they happen to work on any project (use outer join).
m) List the employee name, project name on which they work and the department they belong to for all the employees using alias names for the resulting columns.
n) Retrieve the names of all employees who work on more than one project department wise.
o) List all the departments that contain at least one occurrence of 'C' in their names.

5) Create a view that has project name, controlling department name, number of employees and total hours worked on the project for each project with more than one employee working on it.

a) List the projects that are controlled by one department from this view.
b) List the managers of the controlling departments for all the projects.
c) Demonstrate one update operation on this view.
d) List the Location of the controlling departments for all the projects.
e) Retrieve the data from the view.

PL/SQL LAB CYCLE

CYCLE-II

6. Write a PL/SQL Block to find whether the number is Armstrong or not.
7. Write a PL/SQL program for generating Fibonacci series
8. Write an anonymous PL/SQL block that fetches and displays the data from employee table to the console.
9. Write a program that updates salaries of all employees with 10 % hike (use cursors).
10. Write a program to fetch salary and employee name from employee table for a given user input. When no data found raise an exception that prints the message "no data found".
11. Write a program to find the number of records of any given table using % c ROWCOUNT.
12. Write a cursor to display the list of employees and total salary department wise.
13. Write a database trigger on employee table so that the trigger fires when all the DML statements are executed (print appropriate message).
14. Write a trigger in such a way that it should not allow insert or update or delete on Wednesday and Thursday and display the proper message.
15. Write a procedure to display the name and salary of employee when user inputs SSN using IN/OUT parameters.
16. Write a function to check the validity of the given employee number from the employee table (print the appropriate message using PL/SQL block).

L	T	P	Cr.
-	-	2	1

B.Tech. (IV Sem.) **17CS61 - LINUX PROGRAMMING LAB**

Pre-requisites **:** Programming Knowledge

Course Educational Objective: To familiarize students with the Linux environment and to learn the fundamentals of shell scripting/programming.

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

CO1 :Apply built in commands for file processing.
CO2 : Design and implement Linux shell scripts.
CO3 : Design And Implement AWK scripts.
CO4 : Develop programs to implement system calls.

Week1

Session-1

a)Log into the system
b)Use vi editor to create a file called myfile.txt which contains some text.
c) Correct typing errors during creation.
d)Save the file
e)Logout of the system

Session-2

a)Log into the system
b)Open the file created in session 1
c)Add some text
d)Change some text
e)Delete some text
f)Save the Changes
g)Logout of the system

Week2

a. log in the system
b. use the appropriate commands to determine your login shell
c. use the /etc/passwd file to verify the result of step b.
d. use the who command redirect the result to a file called myfile.txt. Use the more command to see the contents of myfile.txt.
e. Use the date and who commands in sequence ?(in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile1.txt. Use the more command to check the contents of myfile1.txt.

Week3

Log into the system
Use the cat command to create a file containing the following data. Call it mytable.txt use tabs to separate the fields

1425	ravi	15.65
4320	ramu	26.27
6830	sita	36.15
1450	raju	21.86

a. use the cat command to display the file, mytable.txt
b. use the vi command to correct any errors in the file, mytable.txt
c. use the sort command to sort the file mytable.txt according to the first field. Call the sorted file mytable.txt (same name)
d. print the file mytable.txt

e. use the cut & paste commands to swap fields 2 and 3 my table. Call it mytable.txt (same name)
f. print the new file, mytable.txt
g. logout of the system

Week4

a) Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.
b) Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.
c) Write a shell script that determines the period for which a specified user is working on the system.

Week5

Write a shell script that computes the total and average marks of a student according to the following

If average marks ≥69 then result is "Distinction"
If average marks ≥59 and ≤ 70 then result is "First Class"
If average marks ≥49 and ≤ 60 then result is "Second Class"
If average marks ≤ 50 then result is "Pass"
Note that any subject marks ≤ 40 then result is "Fail"

Accept student name and six subject marks through the key board

Week6

a) Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.
b) Write shell script that takes a login name as command – line argument and reports when that person logs in
c) Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

Week7

a)Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers.
b)Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

Week8

a) Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
b) Develop an interactive script that ask for a word and a file name and then tells how many times that word occurred in the file.

Week9

a) Write a shell script to perform the following string operations:
i)To extract a sub-string from a given string.
ii)To find the length of a given string.
b) Write aawk script to find the number of characters, words and lines in a file.

Week10

Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:

i) File type
ii) Number of links

iii) Read, write and execute permissions
iv) Time of last access (Note: Use stat/fstat system calls)

Week11

Write C programs that simulate the following Unix commands:

a) mv
b) cp
c) ls

(Use system calls)

Week12

Write a program for bubble sorting using fork system call in linux

TEXT BOOKS

1. Sumitabha Das., Your "Unix The Ultimate Guide", TMH Publications, 2001.
2. M.G. Venkatesh Murthy, "Introduction to UNIX & SHELL programming" , Pearson Education, First Edition, New Delhi, 2009.

REFERENCES

1. B.A. Forouzan& R.F. Giberg, "Unix and shell Programming", Thomson, First Edition, New Delhi, 2003.
2. E. Foster – Johnson & others, "Beginning shell scripting", John Wiley & sons, First Edition, New Delhi, 2008.
3. Sumitabha Das, "Unix concepts and applications", TMH Publications, 4th Edition,.
4. Gaham Glass & K. Ables, Unix for programmers and users, Pearson education,3rdedition.

L	T	P	Cr.
-	-	2	1

B.Tech. (IV Sem.) **17CI65 - OOPS THROUGH JAVA LAB**

Pre-requisites **:** C, C++.

Course Educational Objective: Concentrates on the methodological and technical aspects of software design andProgramming based on OOP.Acquire the basic knowledge and skills necessary to implement object-orientedprogramming techniques in software development through JAVA.Know about the importance of GUI based applications and the development of applications through JAVA.

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

CO1: Implement and Test the concepts of OOP in program design with a few example exercises.

CO2: Implement and Test the performance of Exception handling, Multithreading concepts with a few example exercises.

CO3: Implement and Test the performance of GUI based applications using AWT, Swings.

I. Exercise programs on basic control structures & loops:

a) Write a java program to generate Fibonacci series.
b) Write a java program to check whether given number is prime or not?
c) Write a java program to find out area of a circle.
d) Write a java program to reverse the given number.
e) Write a java program to find the sum of the numbers by using Command line arguments.
f) Write a java program to find the roots of a quadratic equation.

II. Exercise programs on Recursion in java:

a) Write a java program to find the factorial of a given number using recursion.
b) Write a java program to find sum of 'n' numbers using Recursion.

III. Exercise programs on Arrays in java:

a) Write a java program to find min and max number of given Array.
b) Write a java program to perform matrix Multiplication.
c) Write a java program to search an element by using linear search.
d) Write a java program by using Bubble sort.

IV.Exercise programs on Constructors & Method overloading

a) Write a java program to implement Over Loading?
b) Write a java program using Constructors.
c) Write a java program to implement constructor overloading.

V. Exercise programs on String &StringBuffer classes:

a) Write a java program using StringBuffer class methods?
b) Write a java program to check whether the given string is palindrome (or) not?
c) Write a java program to sort the Strings in ascending order.

VI. Exercise programs on Inheritance, super & final keywords:

a) Write a java program to implement stack ADT?
b) Write a java program using Inheritance.
c) Write a java program illustrating all three usages of super key word.
d) Write a java program using Abstract class.
e) Write a java program by using final variables and final methods.

VII.Exercise programs on Runtime Polymorphism in java:

a) Write a java program to implement Overriding.
b) Write a java program to implement Dynamic method dispatch.

VII.Exercise programs on packages & interfaces.

a) Write a java program to demonstrate Packages.
b) Write a java program to implement multiple inheritance using interfaces.
c) Write a java program to implement StringTokenizer class.
d) Write a java program to implement the Date class.

VIII. Exercise programs on Exception handling &Multithreading.

a) Write a java program by using Exception handling mechanism.
b) Write a java program to implement chained exception.
c) Write a java program to create Multiple Threads using Thread class.
d) Write a java program to create Multiple Threads using Runnable interface.
e) Write a java program to synchronize Multiple Threads.

IX.Exercise programs on Applets & Event Handling:

a) Write a simple Applet program.
b) Write an applet program using Graphics.
c) Write an applet program to pass parameters to Applet.
d) Write an applet program to display information an applet.
e) Write an applet program to handle Mouse events.
f) Write an applet program using Key events.

X.Exercise programs on AWT Components & Layout Managers.

a) Write a java program by using AWT components.
b) Write a java program to various layout managers (border, flow, and grid).

XI. Exercise programs on Swings:

a) Write a java program by using swing components.
b) Write a java program to by using swing scroll bars.

B.Tech. (IV Sem.)	17PD03 - PROFESSIONAL ETHICS AND HUMAN VALUES	L	T	P	Cr.
		3	-	-	0

Pre requisite: Basic Sciences and Humanities

COURSE EDUCATIONAL OBJECTIVES:

1. To create an awareness on engineering ethics and human values.
2. To adumbrate the inevitability of different intellectual property rights like patents, copyrights, trademarks, and trade secret.
3. To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth.
4. To explicate the professional and societal responsibilities of the engineers.
5. To make the student realize the sensitiveness associated with experimentation process

COURSE OUTCOMES: At the end of the course, the student

CO1 : Acquires the basic concepts of human values & also gain the connotations of ethical theories.

CO2: Knows the basic concepts of Professional ethics and handling Dilemma in decision making.

CO3: Knows the duties and rights towards the society in an engineering profession

CO4: Would realize the importance and necessity of intellectual property rights.

CO5: Can take all the necessary precautions while conducting the experiments, which may reduce the risk.

UNIT –I: **ETHICS**

Senses of 'Engineering Ethics' -Variety of moral issues - Types of inquiry -Moral dilemmas Moral autonomy -Kohlberg's theory Gilligan's theory -Consensus and controversy – Models of Professional Roles -Theories about right action- Self interest - Customs and religion -Uses of Ethical theories.

UNIT - II: HUMAN VALUES

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

UNIT – III: ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation- Engineering Projects VS. Standard Experiments - Engineers as responsible experimenters – Codes of ethics - Industrial Standards - Abalanced outlook on law- The challenger case study.

UNIT – IV: SAFETYAND RESPONSIBILITIES

Safety and risk- Assessment of safety and risk- Risk benefit analysis and reducing risk- Three Mile Island and Chernobyl case study - Collegiality and loyalty -Respect for authority- Collective bargaining – Confidentiality- Conflicts of interest- Occupational crime-Professional Rights-Employee Rights –Intellectual Property Rights(IPR) discrimination.

UNIT – V: GLOBAL ISSUES

Multinational Corporation’s -Environmental ethics-computer ethics -weapons development Engineers as managers - consulting engineers-engineers as expert witnesses and advisors, Moral leadership - sample code of Ethics (Specific to a particular Engineering Discipline).

TEXT BOOKS

1. R.S.Nagarajan, a Textbook on "Professional Ethics and Human Values", New Age Publishers – 2016.
2. Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill, New York 1996.
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M. Jayakumaran- Laxmi Publications.
4. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.

REFERENCES

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
2. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)
3. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available).
4. John R Boatright, "Ethics and the conduct of business", Pearson Education, New Delhi,2003.
5. Edmund G Seebauer and Robert L Barry, "Fundamentals of ethics for scientists and engineers", Oxford University Press, Oxford, 2001.
6. "Fundamentals of ethics for scientists and engineers" Edmund G Cseebauer and Robert L Barey,Oxford University Press, 2001.
7. "Text book on Intellectual Property rights", N K Acahrya, Asian Law House, 7th edition,2014.
8. "An Introduction to Intellectual Property Rights", Dr.J.P.Mishra,Central law House, 3rd edition,2012.

B.Tech. (V Sem.)	17HS01 - ENGINEERING ECONOMICS AND ACCOUNTANCY	L	T	P	Cr.
		3	-	-	3

Prerequisite: Basic Sciences and Humanities

Course Objective: The objective of this course is to inculcate basic knowledge to students relating to concepts of Engineering Economics and Accountancy to make them effective business decision makers.

Other course educational objectives of this course:

1. To know the concepts of engineering economics and to make them effective business decision makers.
2. To understand the concepts of production and cost for various business decision.
3. To understand the different types of market, market structures & pricing strategies and their applications in business decision making.
4. To explain the strategies of raising and utilization of business capital.
5. To understand the Fundamental of accounting and analysis of accounting statements for managerial decision making.

Course Outcomes: After completion of the course, students will be able to

CO1: Capable of analyzing fundamentals of economics concepts which helps in effective business administration.
CO2: Discuss cost- output relationship in business operations.
CO3: Analyze the features of market structures and present the pricing policies.
CO4: Identify the types of Business organization of the company and the implementation requirements of each one.
CO5: Financial position of the company can be analyzing with the help of financial statements.

UNIT - I

Introduction to Engineering Economics: Economics – Definitions- Nature and Scope - Branches economics – Engineering Economics-features & Scope

Demand Analysis: Demand- Types of demand- Determinants- Law of Demand -Elasticity of demand – significance -Types of Elasticity of Demand.

Demand Forecasting-Types- Factor governing - Methods of demand Forecasting.

UNIT - II

Theory of Production and Cost Analysis: Production Function – Isoquant and Isocost, MRTS, Least Cost Combination of Inputs. Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Cost & output relationship in short run & long run, Break-even Analysis (BEA)-Determination of Break-Even Point - Significance and limitations.

UNIT – III

Markets & Pricing Policies:

Market structures: Markets-Types of markets - Features and price out determinations under Perfect competition, Monopoly, Monopolistic Competition, oligopoly markets.

Pricing –Pricing polices &its Objectives – Pricing Methods and its applications in business.

UNIT - IV

Capital and Capital Budgeting: Capital and its significance-Types of Capital-Estimation of Fixed and Working capital –working capital -Components of working capital & Factors determining the need of working capital.- Sources of raising capital

Capital budgeting-Significance –Process- Techniques of Capital Budgeting (non-discounted cash flow techniques and discounted cash flow of techniques).

UNIT - V

Financial Accounting and analysis: Accounting –significance -- Book Keeping-Double entry system –Journal- Ledger- Trial Balance- Final Accounts with simple adjustments.

Financial Statement Analysis through ratios: Ratio-analysis of financial statement using different ratios (Liquidity -Profitability- Solvency -Activity ratios).

TEXT BOOK

Aryasri: Managerial Economics and Financial Analysis, MHE, 2014.

REFERENCES

1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2003.
2. AmbrishGupta,Financial Accounting for Management, Pearson Education, New Delhi.
3. Lipey&Chrystel, Economics, Oxford University Press.
4. Domnick Salvatore: Managerial Economics in a Global Economy,4th Edition,Thomson.

B.Tech. (V Sem.)	17CI11 - COMPUTER GRAPHICS	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge of coordinate geometry and basics of computer.

Course Educational Objective (CEO):
Students will have an appreciation of the history and evolution of computer graphics, both hardware and software. Students will have an understanding of 2D graphics and algorithms which include line drawing, polygon filling, clipping, and transformations. Students will understand the concepts &techniques used in 3D computer graphics, including viewing transformations, hierarchical modeling, colour, lighting and texture mapping.

Course Outcomes: After the completion of this course, student will be able to:
CO1: Summarize the working principle of display devices, interactive input devices and graphic applications.
CO2: Analyse line, circle, ellipse and character generation algorithms.
CO3: Evaluate geometrical transformations including translation, scaling, rotation, reflection and shear for 2-Dimensional objects.
CO4: Apply clipping algorithms on points, lines and polygons.
CO5: Distinguish parallel and perspective projections and apply transformation techniques for 3-Dimensional objects.

UNIT – I
Introduction: Usage of Graphics and their applications in Presentation Graphics, Computer Aided Design, Computer Art, Entertainment, Education and Training, Visualization, Image Processing, Graphical User Interfaces.
Overview of Graphics systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Graphic monitors and workstations, Input devices.

UNIT – II
Output primitives: Points and Lines, Line Drawing Algorithms, Loading the Frame buffer, Line function, Circle Generating Algorithms, Ellipse Generating Algorithms, Other Curves, Parallel Curve Algorithms, Curve Functions, Pixel Addressing, Filled Area Primitives, Filled Area Functions.

UNIT – III
Two Dimensional Geometric Transformations: Basic Transformations, Matrix Representations, Homogeneous Coordinates, Composite Transformations, Other Transformations, Transformations between Coordinate Systems, Affine Transformations, Transformation Functions, Raster methods for Transformation.

UNIT – IV
Two Dimensional Viewing: The viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Two Dimensional Viewing Functions, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping.

UNIT – V
Three Dimensional Concepts and Object representations: 3D display methods, 3D Graphics-Polygon Surfaces, Curved Lines and Surfaces, Quadratic Surfaces
Three Dimensional Geometric and Modeling Transformations: Translation, Rotation, Scaling, Other Transformations, Composite Transformations, 3D Transformation Functions, Modeling and Coordinate Transformations.

TEXT BOOK

Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004 (Chapters 1 to 12 except 10-9 to 10-22 of the Text book)

REFERENCES

1. David F. Rogers "Procedural Elements for Computer Graphics" TMH Publications.
2. J. D. Foley, S. K Feiner, A Van Dam F. H John; "Computer Graphics: Principles & Practice in C" Pearson.
3. Franscis S Hill Jr "Computer Graphics using open GL"; Pearson Education, 2004.
4. www.youtube.com/c/sundeepsaradhi
5 https://www.tutorialspoint.com/computer_graphics/index.htm

B.Tech. (V Sem.)	17CS02 - PRINCIPLES OF PROGRAMMING LANGUAGES	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge of Structured Programming and Object Oriented Programming constructs.

Course Educational Objective (CEO): Introducing the programming language categories and implementation methods. Introducing how to describe syntax. Learning various concepts of Imperative Programming Languages and the process of responding to the occurrence of exceptions & events.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Compare various categories of Programming Languages and their implementation methods, and represent the programming languages syntax using BNF, EBNF.
CO2: Explore Semantic issues of variables in different programming languages and the design issues of the various categories of data types.
CO3: Analyse statement level constructs and explore design issues of subprograms.
CO4: Explore the process of responding to the occurrence of exceptions & events in Ada, C++ and Java.
CO5: Analyse various kinds of concurrency and explore design issues for providing support for concurrency by Ada, Java and C# languages.

UNIT – I:

Preliminary Concepts: Reasons for studying concepts of programming languages, Language categories - Imperative, Functional, Logic and Object Oriented. Programming Language Implementation Methods.

Describing Syntax: General Problem of describing Syntax, Formal methods of describing syntax - BNF, EBNF for common programming languages features, Parse trees, Ambiguous grammars, Attribute grammars.

UNIT – II:

Names, Bindings, Type Checking and Scopes: Names, Variables, The Concept of Binding, Type Checking, Strong Typing, Type Compatibility, Scope and Lifetime.

Data types: Introduction, Primitive Data Types, Character String Type, User Defined Ordinal Types, Array Types, Associative Arrays, Record Types, Union Types, Pointer and Reference Types.

UNIT – III:

Statement-Level Control Structures: Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

Subprograms: Fundamentals of Subprograms, Design issues of Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that are Subprogram Names, Overloaded Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Co-routines.

UNIT – IV:

Exception Handling and Event Handling: Introduction to exception handling, Exception Handling in Ada, Exception Handling in C++, Exception Handling in Java, Introduction to event Handling, Event Handling with Java, Event Handling in C#.

UNIT – V:

Concurrency: Introduction, Introduction to subprogram-level concurrency, Semaphores, Monitors, Message Passing, Ada Support for Concurrency, Java Threads, C# Threads, Concurrency in Functional Languages, Statement-Level Concurrency.

TEXT BOOK:

Robert .W. Sebesta –"Concepts of Programming Languages" Pearson Education, 10th edition.

REFERENCES

1. Ghezzi, "Programming languages", John Wiley, 3rd edition.
2. Pratt and Zelkowitz–"Programming Languages Design and Implementation" PHI/Pearson Education, 4th edition.
3. http://nptel.ac.in/courses/106102067/
4. https://perso.telecom-paristech.fr/pautet/Ada95/a95list.htm
5. http://www.pascal-programming.info/index.php
6. https://www.fortrantutorial.com/

B.Tech. (V Sem.) **17CI12 - HUMAN COMPUTER INTERACTION**

L	T	P	Cr.
3	-	-	3

Prerequisite: Knowledge of Computer and Its Architecture.

Course Educational Objective (CEO):To provide basic methodologies and processes for designing interfaces. To improve the interaction between users and computers by making computers more usable and receptive to the user's needs. To provide relevant principles of behaviour, mostly derived from cognitive science and psychology and other sources that describe human ethologic in particular environment, especially technological ones. To make the students familiar with developing new interfaces and interaction techniques.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Identify the elements of good user interface design through effective GUI.
CO2: Identify the importance of human characteristics and understanding business functions.
CO3: Analyze screen design principles for making good decisions based on technological considerations in interface design.
CO4: Select the window, device and screen based controls through navigation schemes.
CO5: Identify the basic components and interaction devices to interact with the computers.

UNIT – I:

Introduction: Importance of user Interface – definition, importance of good design, benefits of good design. A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT – II:

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT – III:

Screen Designing : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT – IV:

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.

UNIT – V:

Components – text and messages, Icons and images – Multimedia, colour – uses, problems with choosing colours.

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOK:

Wilbert O Galitz, "**The Essential Guide to User Interface Design**", Wiley DreamaTech, Third Edition, 2007.

REFERENCES:

1. Ben Shneiderman,CatherinePlaisant,"**Designing the User Interface"**,Fourth Edition, Pearson Education ,2008.
2. ALAN DIX, JANET FINLAY, GREGORYD. ABOWD, RUSSELL BEALE,**"Human-Computer Interaction",**Third Edition,PEARSON,2009.
3. http://ps.fragnel.edu.in/~dipalis/prgdwnl/eguid.pdf
4. https://www.alljntuworld.in/download/human-computer-interaction-materials-notes/
5. http://www.crectirupati.com/sites/default/files/lecture_notes/HCI-notes.pdf

B.Tech. (V Sem.)	17CI13 - ADVANCED DATABASE MANAGEMENT SYSTEMS	L	T	P	Cr.
		3	-	-	3

Prerequisite: The student should have the knowledge of database management systems and algorithms.

Course Educational Objectives(CEO): To introduce basic concepts of different types of databases like distributed databases, object oriented databases and parallel databases and to give basics of designing different types of databases.

Course Outcomes(COs): By the completion of the course, the students should be able to:
CO1: Outline the concepts of relational database system.
CO2: Understand the basic concepts in distributed databases.
CO3: Analyze the advanced concepts of distributed databases.
CO4: Understand the design issues in parallel databases.
CO5: Apply the concepts of object oriented databases to solve real world problems.

UNIT – I:
RELATIONAL MODEL ISSUES: ER model-Normalization-Query processing-query optimization-transaction processing- Database tuning- comparison of different databases.

UNIT – II:
DISTRIBUTED DBMS - Concepts and Design- Introduction, Overview of Networking, Functions and architectures of a DDBMS, Distributed Relational Database Design, and Transparencies in a DDBMS.

UNIT – III:
DISTRIBUTED DBMS: Advanced concepts- Distributed Transaction Management- Distributed Concurrency control-Distributed Deadlock Management-Distributed Database Recovery-Distributed query optimization

UNIT – IV:
Introduction to Parallel databases, architectures for parallel databases, Parallel Query Evaluation – data partitioning and parallelising sequential operator evaluation code, Parallelising individual operations, and parallel Query optimization.

UNIT – V:
Object Database System: Abstract data types, Objects identity and reference types, Inheritance, Database design for ORDBMS, ODMG (Object Data Management Group) data model, ODL (Object Definition Language), OQL (Object Query Language).

TEXTBOOKS:
1. Thomas Connolly, Carolyn Begg "Database Systems, A Practical Approach to Design, Implementation and Management",Tthird edition, Pearson Education (Units - 1,2,3)
2. Raghuramakrishnan and Johannes Gehrke: "Database Management Systems", 3rd Edition, TMH, 2006. (Units - 4,5)

REFERENCES:

1. R.Elmasri, S.B.Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education, 2006.
2. Abraham Silberschatz, Henry F. Korth, S.Sudharshan, "Database system concepts", Fifth Edition, TataMcGraw Hill, 2006.
3. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", eigth Edition, Pearson Education, 2006.
4. https://onlinecourses.nptel.ac.in/noc18_cs15
5. www.nptelvideos.in/2012/11/database-management-system.html
6. nptel.ac.in/courses/106104135/
7. freevideolectures.com › Computer Science › IISc Bangalore

B.Tech. (V Sem.)	17CS03 - UML AND DESIGN PATTERNS	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge in basics of C++ and JAVA Programming

Course Educational Objective (CEO):
The main objective of this course is that the students become familiar with all phases of OOAD and master the main features of the UML. The students know about the main concepts of Object Technologies, how to apply them at work, ability to analyse and solve challenging problem in various domains. Student will use systematic approach that focus and describe abstract systems of interaction between classes and objects.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Select the basic elements of modeling such as Things, Relationships and Diagrams depending on the views of UML Architecture and SDLC.
CO2: Apply Basic and Advanced Structural Modeling Concepts for designing real time applications.
CO3: Analyze Dynamic Aspects of a system using Behavioral Diagrams and Runtime environment of Software Systems.
CO4: Identify the Design Patterns to solve Object Oriented Design Problems.
CO5: Implement Creational Patterns, Structural Patterns and Behavioral Patterns for given applications.

UNIT – I: Introduction to UML:
Why We Model: History of UML, The Importance of Modeling, Principles of Modeling, and Object Oriented Modeling
Introducing the UML: An Overview of the UML, Conceptual Model of the UML, Architecture, and Software Development Life Cycle.

UNIT – II: Structural Modeling:
Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams and Class Diagrams.
Advanced Structural Modeling: Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages, and Object Diagrams.

UNIT – III: Behavioral Modeling:
Basic Behavioral Modeling: Interactions, Interaction Diagrams, Use Cases, Use Case Diagrams, Activity Diagrams.
Advanced Behavioral Modeling: Events and Signals, State Machines, Time and Space, State Diagrams.
Architectural Modeling: Component and Deployment Diagrams.

UNIT – IV: Introduction to Design Patterns:
What is Design pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to select a Design Pattern, How to use a Design Pattern.

UNIT – V: Types of Patterns:
Creational Patterns: Abstract Factory, Builder and Factory method
Structural Patterns: Adapter, Decorator, and Facade.
Behavioral Patterns: Chain of Responsibility, State, and Strategy.

TEXT BOOKS

1. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language UserGuide", Pearson Education, 2nd Edition, ISBN: 0-201-57168-4,1998 (Unit-1 to Unit-3).
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, "Design Patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley Professional, 1st Edition, ASIN: B000SEIBB8, 1994 (Unit-4 to Unit-5).

REFERENCES

1. Meilir Page-Jones, "Fundamentals of Object-Oriented Design in UML", Pearson Education, 1st Edition, ISBN: 9788177586770, 8177586777, and 2007.
2. Eric Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra, "Head First Design Patterns: A Brain-Friendly Guide", O'Reily – SPD, 1st Edition, ISBN: 9789352132775, 9352132777, 2014.
3. https://www.tutorialspoint.com/uml/
4. https://sourcemaking.com/design_patterns

B.Tech. (V Sem.)	17CI14 - WEB TECHNOLOGIES	L	T	P	Cr.
		3	-	-	3

Pre-requisites **:** Java Programming Language.

Course Educational Objective: Students will be familiarized with the tools and web technologies necessary for business application design and development. This course covers client side and server side scripting languages to develop static and dynamic web applications

Course Outcomes: At the end of the course, the student will be able to:
CO1: Design web pages by using HTML and DHTML.
CO2: Develop user defined tags and transfer data between components by using XML and Java Beans.
CO3: Create data driven web applications by applying database connectivity techniques.
CO4: Design and implement dynamic WebPages using server side components like servlets.
CO5: Understand concepts of JSP and struts framework and apply them in solving real world problems.

UNIT-I: HTML & DHTML
HTML: Introduction, Versions, Text Formatting Tags, Lists, Tables, Images, links, marquee, Forms, Frames.
CSS: Types of Cascading Style sheets; CSS Selectors, Properties: Text, Backgrounds, Font, Links, Borders, Margins, Cell padding, Layouts.
JAVASCRIPT: Introduction to JavaScript, Objects in Java Script, Dynamic HTML with Java Script, Form validation using JavaScript.

UNIT-II: XML & JAVA BEANS
XML: Document type definition, XML Schemas, Presenting XML, using XML Processors: DOM and SAX.
JAVA BEANS: Introduction to Java Beans, Advantages of Java Beans, Persistence, Java Beans API, EJB introduction.

UNIT-III: JDBC
JDBC: Introduction, Types of Drivers, **java.sql package** - Procedure to establish connection between java applications and database, Database operations - create, insert, delete & update using JDBC, Types of Statements, ResultSet types.

UNIT-IV: SERVLETS
INTRODUCTION TO SERVLETS: Lifecycle of a Servlet, **The Servlet API:** The **javax.servlet** Package- Servlet, ServletRequest, ServletResponse, GenericServlet, ServletConfig, ServletContext, RequestDispatcher. The **javax.servlet.http** package – HttpServlet, HttpServletRequest&HttpServletResponse, HttpSession, Cookie. Accessing different databases from Servlet programs.

UNIT-V: JSP & STRUTS
INTRODUCTION TO JSP: Lifecycle of JSP, scripting elements, Implicit objects, directive elements, action elements. Error Handling and Debugging. Access database from JSP pages.
STRUTS FRAMEWORK: Introduction to Struts, Overview of MVC Design Pattern, and Struts main Components, Controller components (Action Servlet, Request Processor, Action, Action Mapping, Action Form Beans, and Struts Configuration files).

TEXT BOOKS

1. Chris Bates, "Web Programming building internet applications", WILEY Dreamtech, 2nd edition, 2002. (UNITS-1,2)
2. MartyHall, Larry Brown, "Core Servlets and Java Server Pages Volume 1: Core Technologies", Pearson, 2nd Edition, 2004. (UNITS – 3, 4, 5)
3. Bill Siggelkow, "Jakarta Struts Cookbook", O'Reilly Media, 2005. (UNIT-5)

REFERNCES

1. Robert W Sebesta, "Programming the World Wide Web", Pearson Education, 8th Edition, 2015.
2. A.A.Puntambekar, "Web Technologies", Technical Publications, 2009.
3. Harvey M. Deitel, Paul J. Deitel, "Internet and World Wide Web How to program", Pearson Education Asia, 5th Edition, 2008.
4. SubramnyamAllamraju, CeditBuest, "Professional java server programming J2EE 1.3 Edition", Apress Publications, 1.3 Edition, 2001.
5. Budi Kurniawan, "Struts 2 Design and Programming: A Tutorial", BrainySoftware, 2008.
6. https://www.w3schools.com/html/html_intro.asp
7. https://www.javatpoint.com/servlet-tutorial
8. https://www.tutorialspoint.com/jsp/index.htm
9. http://nsr-materials.blogspot.in/2017/02/

B.Tech. (V Sem.)	17CI15 - AUTOMATA THEORY AND COMPILER DESIGN	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge in Discrete mathematics (set theory and graph theory) and programming language.

Course Educational Objective (CEO): To introduce students to the mathematical foundations of computation like automata theory, the theory of formal languages and grammars, the notion of algorithm, decidability, complexity, and computability. Understand the theory and practice of compiler implementation.

Course Outcomes (COs): After the completion of this course, student will be able to:
CO1: Design Finite Automata and Regular expression for regular languages.
CO2: Design Context-free grammar and push-down automata for CFL.
CO3: Design and implement lexical analyzer and syntax analyzer.
CO4: Create framework for syntax directed translation schemes and understand the run-time organization of the program.
CO5: Analyze various code optimization techniques and code generation.

UNIT – I
Introduction to Automata and formal language theory: Basic Mathematical notations and techniques, classification of Automata, definitions and its applications.
Finite state Machine- Deterministic Finite state Automaton (DFA), Nondeterministic Finite state Automaton (NFA), Equivalence of NFA and DFA, Minimization of DFA, examples.
Regular expressions- Equivalence of Regular expressions and Finite Automata, pumping lemma and closure properties.

UNIT – II
Introduction to Grammar– Context-free Grammar (CFG), derivation, parse tree, ambiguity, Simplification of CFG, Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).
Pushdown Automata-Definition, Equivalence of Context-free Languages and pushdown Automata, Deterministic Pushdown Automaton, pumping lemma and properties of context-free Languages.

Unit – III
Introduction to compiler: Basic Language processing system, phases of a compiler, Bootstrapping.
Lexical Analysis: The role of a Lexical analyser, input buffering, Specification and Recognition of tokens, LEX tool.
Syntax Analysis: The role of a Parser**,** top-down parsing- recursive descent and predictive parsing, Bottom -up parsing-Handle pruning, shift-reduce parsing, LR parsers-SLR, CLR and LALR,YACC tool.

UNIT – IV
Syntax-Directed translation (SDT): Attribute grammar, Syntax-Directed Definitions (SDD), and Translation schemes, Applications of SDT's.
Intermediate Code Representations- syntax tree, three- address code and static single-Assignment. Translation of expressions and statements.
Run-time Environment: Storage organization, storage allocation strategies, access to non-local data and parameter passing techniques.

UNIT – V

Basics of Code optimization: Basic blocks and flow graphs, the principal sources of optimization, optimization of Basic blocks, loops in flow graph**.**

Code generation: Issues in the design of a code generator, generic code generation algorithm, Register allocation and assignment, DAG representation of basic blocks, peephole optimization Generating code from DAG.

TEXT BOOKS

1. John E. Hopcraft and J.D.Ullman, "Introduction to Automata Theory Languages and Computation", Narosa Publications, 1999 (for 1, 2 units)
2. Alfred V.Aho, Jeffrey Ullman, Ravi sethi, "Compilers Principles, Techniques and Tools", Pearson Education, 2nd Edition, 2008. (for 3, 4, 5 units)

REFERENCES

1. Sipser , "Introduction to Theory of Computation" ,Thomson,2nd Edition
2. Mishra and Chandrashekaran, "Theory of Computer Science – Automata languages and computation –"2nd edition, PHI
3. ParagH.Dave, HimanshuB.Dave "Compilers Principles and Practice" , Person Education, First Edition, 2012.
4. Andrew W.appel "Modern compiler implementation in C" Cambridge, Revised Edition, 2010.
5. http://nptel.ac.in/courses/111103016/ (Video lectures for Automata theory and formal languages)
6. http://nptel.ac.in/courses/106108052/ (Video lectures for Compiler design)

B.Tech. (V Sem.)	17CS04 - OPERATING SYSTEMS	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge of Computers fundamentals, Data structures & CO.

Course Educational Objective (CEO):
The main objective of the course is to provide basic knowledge of computer operating system structure and functioning. Students able to understand how Operating Systems evolved with advent of computer architecture. Comprehend the different CPU scheduling algorithms, page replacement algorithms and identify best one.

Course Outcomes (COs): After the completion of this course, student will be able to:
CO1: Identify the functional aspects and implementation methods (system call And System programs of different modules in a general purpose operating System).
CO2: Evaluate scheduling and communication methods of processes handled by Operating systems through examples.
CO3: Analyse the process synchronization methods and deadlock handling Approaches employed in operating systems.
CO4: Evaluate memory management strategies such as paging and segmentation, Virtual Memory, swapping, and page replacement algorithms.
CO5: Analyse the implementation strategies of file systems regarding directory, Allocation, free space management and file recovery.

UNIT – I:
Introduction: Computer-System Organization, Computer-System Architecture, Operating System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special-Purpose Systems
Operating-System Structures: Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure, Virtual Machines, Operating-System Generation, System Boot.

UNIT – II:
Processes: Concept, Process Scheduling, Operations on Processes, Inter-process Communication, Examples of IPC Systems, Communication in Client-Server Systems.
Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues.
Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling.

UNIT – III:
Synchronization-The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples, and Atomic Transactions.
Deadlocks- System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention. Deadlock Avoidance, Deadlock Detection, Recovery from deadlock.

UNIT – IV:
Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.
Virtual Memory Management: Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory.

UNIT-V:

File-System- The Concept of a File, Access Methods, Directory Structure, File-System Mounting, File Sharing, Protection.

Implementing File System: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery.

TEXT BOOK:

1. Silberschatz& Galvin, "Operating System Concepts", Wiley, 7th edition, 2007.

REFERENCES:

1. William Stallings, "Operating Systems", PHI, 5th Edition, 2004.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", TMH Publications, 1998.
3. Andrew S.Tanenbaum, "Modern Operating Systems", PHI, 2nd edition, 1995.
4. http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir/index.html
5. https://www.youtube.com/watch?v=jciGIvn7UfM&list=PLTgavEZk0mZX7P2WVuE6hN9qVnkTgrAc9

B.Tech. (V Sem.)	17CS62 - UML AND DESIGN PATTERNS LAB	L	T	P	Cr.
		-	-	2	1

Prerequisite:Knowledge in Basics of JAVA Programming

Course Educational Objective (CEO):

The main objective of this course is that a student will be familiar with principles behind the Object Oriented Design and able to apply those principles in a project setting. Students will analyze applications and know how to take a pragmatic approach to software design and development.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Analyze Software Requirements for the given Software Application using Use Cases of UML.

CO2: Develop the UML Diagrams to view Software System in Static and Dynamic Aspects.

CO3: Select a Design Pattern related to their problem and draw the Class and Object Diagrams using the UML notations.

UML:

Consider the following Case Studies:

1) Automated Teller Machine (ATM)
2) Library Management System
3) Railway Ticket Reservation System
4) Point-of-Sale Terminal
5) Customer Support Service Operations
6) Cab Booking Service

Week-1: Basics of UML

1) Introduction to UML
2) Familiarization with any one of the Software such as Rational Rose or Umbrello or Gliffy Diagram etc.

Week-2: For each case study given earlier, Construct Use Case Diagram in the following manner:

1) Identify and Analyze the Actors
2) Identify the Actions
3) Analyze the Relationships between Actors and Actions
4) Sketch the Use Case Diagram

Week-3 and Week-4: For each case study given earlier, Construct Class and Object Diagram in the following manner:

1) Identify and Analyze the Classes related to your problem
2) Analyze the Attributes and Operations
3) Analyze the Relationships between Classes
4) Sketch the Class Diagram

Week-5: For each case study given earlier, Construct Interaction Diagrams in the following manner:

1) Identify the Objects participating in Communication
2) Identify the Messages between the objects
3) Give numbering to messages
4) Use Flat Sequencing or Procedural Sequencing for numbering

Week-6: For each case study given earlier, Construct Activity Diagram in the following manner:

1) Identify activities in your case study.
2) Identify relationships among activities.
3) Use Fork or Join, if necessary.
4) Sketch the diagram.

Week-7: For each case study given earlier, Construct State Chart Diagram in the following manner:

1) Identify the different states in your case study.
2) List out the different sub-states present in the state.
3) Identify relationships among the state to state.
4) Sketch the diagram.

Week-8:For each case study given earlier, Construct Component Diagram in the following manner:

1) Identify the different components in your case study.
2) Create a visual for each of the component.
3) Describe the organization and relationships between components using interfaces, ports etc.
4) Sketch the diagram.

Week-9: For each case study given earlier, Construct Deployment Diagram in the following manner:

1) Identify the nodes.
2) Identify the relationships among the nodes.
3) Sketch the Diagram.

DESIGN PATTERNS:

Week-10: Construct the CLASS DIAGRAM/OBJECT DIAGRAM for:

1) "Drawing Editor" based on "ABSTRACT FACTORY" Design Pattern.
2) "Converter (Text to ASCII, PDF, Doc.,etc.)" based on "BUILDER" Design Pattern.

Week-11: Construct the CLASS DIAGRAM/OBJECT DIAGRAM for:

1) "Media Player" based on "ADAPTER" Design Pattern.
2) "Different Toppings on Pizza" based on "DECORATOR" Design Pattern.

Week-12:Construct the CLASS DIAGRAM/OBJECT DIAGRAM for "Conducting a Quiz Competition "based on "CHAIN OF RESPONSIBILITY" Design Pattern.

TEXT BOOKS

1. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language UserGuide", Pearson Education, 2nd Edition, ISBN: 0-201-57168-4, 1998.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, "Design Patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley Professional, 1st Edition, ASIN: B000SEIBB8, 1994.

REFERENCES

1. Meilir Page-Jones, "Fundamentals of Object-Oriented Design in UML", Pearson Education, 1st Edition, ISBN: 9788177586770, 8177586777, and 2007.
2. Robert B. Jackson, Stephen D. Burd, John W. Satzinger, "Object-Oriented Analysis and Design with the Unified Process", Cengage Learning, 1st Edition, ISBN: 9788131502693, 8131502694, 2007.
3. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", PHI, 3rd Edition, ISBN: 978-0131489066, 2004.
4. Eric Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra, "Head First Design Patterns: A Brain-Friendly Guide", O'Reily – SPD, 1st Edition, ISBN: 9789352132775, 9352132777, 2014.
5. https://www.uml-diagrams.org/index-examples.html
6. https://www.lucidchart.com/pages/UML-diagram-examples
7. https://creately.com/blog/diagrams/uml-diagram-types-examples/
8. https://www.go4expert.com/articles/design-pattern-simple-examples-t5127/
9. https://www.journaldev.com/1827/java-design-patterns-example-tutorial
10. https://www.tutorialspoint.com/design_pattern/design_pattern_quick_guide.htm

L	T	P	Cr.
-	-	2	1

B.Tech. (V Sem.) **17CI66 - WEB TECHNOLOGIES LAB**

Pre-requisites **:** Students should have the knowledge of Java Programming Language.

Course Educational Objective: The main objective of the course is, student will be familiar with client server architecture and able to develop interactive, dynamic web applications by using java technologies.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Design and implement static & dynamic websites.
CO2: Create reusable components by using Java Beans.
CO3: Design and implement data driven web applications.

Lab Program(s)	
1	a) Design a HTML program which includes all basic Text Formatting Tags. b) Design a HTML program by using the following Tags. i) Anchor (<A>) Tag. ii) <Marquee> and its Attributes. iii) Image (<Img>) Tag and its Attributes. c) Design a HTML program by using various types of Lists.
2	a) Design a HTML program by using Table concept. b) Design a HTML program for Student Registration which includes all Form controls.
3	Design the following static web pages required for Online Book Store. • **Home page: -** The static home page must contains three pages • **Top frame: -** Logo and college name and links to homepage, login page, registration page, catalogue page and cart page. • **Left frame: -** At least four links for navigation which will display the data of respective links in the right frame. • **Right frame: -** The pages to links in the left frame must be loaded here; initially it contains the description of the website.
4	Design a web page using CSS which includes the following: a) Use different Text, font styles b) Set background image for both the page and single elements on page. c) Control the repetition of image with background-repeat property d) Define style for links as a:link, a:active, a:hover, a:visited e) Work with layers.
5	a) Develop JavaScript code to validate the following fields of a Registration page. 1) Text Field 2) Password Field 3) Email Field 4) Radio Button 5) Dropdown List 6) Checkbox. b) Design XML file which displays the following book details. 1) Title of book 2) Author name 3) Edition 4) Price Develop DTD/XML Schema file to validate the above XML file and display the details in a table (to do this use XSL).
6	a) Develop a sample Java Bean program by using setter and getter methods and access it from your simple Java program. b) Prepare a simple Java Bean component program and deploy it in BDK. c) Write the procedure to add start and stop button events to Juggler Bean in order to control it.

7	Develop a Java program to connect database by using JDBC and perform various DDL & DML commands.
8	Write the Procedure to Install Apache Tomcat Web Server and deploy a static website & Access it. a) Install Apache Tomcat Server on port number 8080 b) Deploy html pages in a web server c) Access static website from a web server
9	a) Develop a Sevlet program to AUTHENTICATE User details b) Develop aSevlet program to implement Session Management concept.
10	a) Develop a Servlet program to access Init parameter values form web.xml by using ServletContext interface. b) Develop a Servlet program to navigate from one Servlet page to another Servlet page using RequestDispatcher interface.
11	Develop a Servlet program to access Database using JDBC.
12	a) Develop a program to display & validate user credentials using useBean tag of JSP b) Develop JSP program by using JSP implicit Objects
13	**Design JSP program which does the following job:** Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database using JDBC.
14	Design a Simple Struts application program by using Net Beans IDE.

MINI PROJECT: STUDENT INFORMATION SYSTEM

You can use Servlet/JSP to do this project

Your Main page consists 2 links i.e. a) Registration page b) Login page

a) Registration page: Student data should be submitted by using Student Registration form. The data should be stored in database.Registration form has the following fields.

i) Student Name ii) Password iii) Age iv) Gender v) Email Id

b) Login page: Authenticate the student when he submits the login form using the Student name and password from the database using JDBC. If the Student is authorized person i.e. Registered Student then goes to Student Home page, otherwise display error message. Use Session concept here; set the Session variable for every student name.

Student Home page: It consists 3 links

a) Display Student Data: Display the Student details through HTML table form Database by using JDBC.

b) Delete Student Data: It has a form field with Student Name. Whenever you entered the Student Name the corresponding Student data will be deleted from the Database.

c) Logout: Whenever student pressed logout link, the Session variable which is created at the time of login should be suspended and invalidated. Until it would be in alive mode.

B.Tech. (V Sem.)	17PD04 - MINI PROJECT	L	T	P	Cr.
		-	-	4	2

Pre-requisites: Software Engineering, UML and any programming language.

Course Educational Objective: To guide the students such a way that they carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations. The project work so chosen by the student shall culminate in gaining of major design experience in the related area of specialization.

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

CO1: Apply Process of Project Development to Analyze and design the real world problem.
CO2: Learn and use modern tools to solve problems efficiently.
CO3: Document the project report of various phases for future scope of the project Development.

B.Tech. (V Sem.)	17PD05 - EMPLOYABILITY ENHANCEMENT SKILLS - I	L	T	P	Cr.
		1	-	-	0

Prerequisite: NIL

Course Educational Objective (CEO): This course will make students proficient in Quantitative techniques, language & communication skills to qualify in placement tests, ,demonstrate industry-readiness skills by applying concepts and tools that will serve as building blocks for analytical thinking and professional development.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Apply Quantitative techniques and logical thinking to qualify in recruitment tests and other professional tasks.
CO2: Communicate effectively in various professional and social contexts.
CO3: Apply Verbal skills effectively in Job Interviews as well other professional contexts.
CO4: Demonstrate various principles involved in Quantitative problem solving, thereby reducing the time taken for performing job functions.
CO5: Practice lifelong learning through personal effectiveness as well as leadership.

UNIT – I
Quantitative Aptitude: Numbers, L.C.M & H.C.Fof numbers, Decimal Fractions,Simplification, Square root & cube root-Practice tests.
Verbal Ability: Introduction to Vocabulary-Root words (Prefixes, Suffixes) - Practice tests

UNIT – II
Quantitative Aptitude: Averages, Problems on Ages, Problems on Numbers, Surds and Indices- Practice tests.
Verbal Ability: Advanced vocabulary- Model tests for GRE/TOEFL/IELTS

UNIT – III
Quantitative Aptitude: Percentages, Profit and Loss- Practice tests
Verbal Ability: Synonyms & Antonyms, Idiomatic expressions-Practice tests

UNIT – IV
Quantitative Aptitude: Ratio And Proportion, Partnership, Chain rule- Practice tests
Verbal Ability: Words often confused & misused, One-word substitutes & Flash card activity-Practice tests

UNIT – V
Quantitative Aptitude: Number Series, Letter Series, Blood Relations, Coding and Decoding, Direction sense test- Practice tests
Verbal Ability: Phrasal verbs, Word analogies, Reading Comprehension-Practice tests

TEXT BOOKS

1. R.S.AGGARWAL, *Objective Arithmetic*, S. CHAND Publishers.
2. R.S.AGGARWAL, *Verbal & Non-Verbal Reasoning*, S. CHAND Publishers
3. Objective English. Edgar Thorpe, Pearson Education, New Delhi.2009
4. Sanjay kumar, PushpLata: Communication skills. Oxford, Delhi, 2012

REFERENCES

1. Meenakshi Raman, Sangeetha: Technical Communication, Oxford University Press, 2008
2. Baron's Guide on GRE
3. Dinesh Khattar, *The Pearson Guide to Quantitative Aptitude*, Pearson Education
4. M. Tyra, *Magical Book on Quicker Maths*, BSC Publishers
5. Quantitative Aptitude by Arun Sharma
6. Vocabulary Builder for Students of Engineering and Technology (A self – study manual for vocabulary Enhancement) Y.Saloman Raju, Maruthi Publishers

B.Tech. (V Sem.)	17CS90 - ADVANCED GRAPH ALGORITHMS (*ADD ON COURSE – I)	L	T	P	Cr.
		3	-	-	3

Prerequisite: Basics in Discrete Mathematics

Course Educational Objective (CEO): Students will be enabled to understand and apply various algorithms in advanced graph theory. They will learn how to apply different matching algorithms and how to decompose the trees. They will further be able to assess the strengths and weaknesses of various algorithms and to analyze their behavior.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Apply mathematical notation from set theory to solve exponential algorithms
CO2: Apply graph-theoretic terminology and notation to solve advanced graph classes
CO3: Understand and prove theorems/lemmas and relevant results in fixed parameter algorithms.
CO4: Understand and solve problems related to Matching algorithms
CO5: Design algorithms and employ appropriate advanced data structures for solving decomposition trees problems efficiently

UNIT - I: EXPONENTIAL ALGORITHMS:
Independent set, Chromatic number: Three Coloring, Domatic partition, the travelling sales man problem, set cover, Dominating set, subset sum, Example problems on each topic.

UNIT - II: GRAPH CLASSES:
Perfect graphs, Cographs: Cotrees, Finding cliques in Cographs, Distance Hereditary graphs: decomposition trees for DH-graphs, Feedback vertex set in DH-graphs
Chordal graphs: Clique trees, Algorithms for Independent set, clique and vertex coloring in Chordal graphs, Interval graphs, Permutation graphs: Cliques and independent sets in permutation graphs, Example problems on each topic.

UNIT - III: FIXED PARAMETER ALGORITHMS:
Vertex cover, a kernel for vertex cover, a better search -tree algorithm for vertex cover, Minimum fill-in, Homogeneous coloring of perfect graphs, Example problems on each topic.

UNIT - IV: MATCHINGS:
Matchings: definition, Hopcroft-karp algorithm, Edmonds algorithm, Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartitie and general graphs), factors of graphs (decompositions of the complete graph), Example problems on each topic.

UNIT - V: DECOMPOSITION TREES:
Graph monors, parameterised feedback vertex set, tree-width: an algorithm for tree width two, k-trees, an $O(n^{k+2})$ algorithm for tree-width, Maximum clique in graphs of bounded tree-width, chromatic number of graphs of bounded tree-width, rank-width, monadic second-order logic, Example problems on each topic.

TEXTBOOK

T. Kloks, Advanced Graph Algorithms February 3, 2012

REFERENCES

1. D.B.West: Introduction to Graph Theory, Prentice-Hall of India/Pearson, 2009
2. J.A.Bondy and U.S.R.Murty: Graph Theory, Springer, 2008.
3. R.Diestel: Graph Theory, Springer(low price edition) 2000.
4. F.Harary: Graph Theory, Narosa, (1988)
5. C. Berge: Graphs and Hypergraphs, North Holland/Elsevier, (1973)

B.Tech. (VI Sem.)	17CS05 - ANDROID TECHNOLOGIES	L	T	P	Cr.
		2	2	-	3

Prerequisite: Knowledge in Java Programming

Course Educational Objective (CEO): This course is designed to learn the basics of Android platform and get to understand the application lifecycle and able implement applications using latest android concepts.

Course Outcomes (COs): After the completion of this course, student will be able to:
CO1: Understand the fundamentals of Android Platform
CO2: Design UI using various UI Components of Android Platform
CO3: Develop android apps using Intents & Broadcast receivers of Android Platform
CO4: Analyse different data repositories in Android Platform.
CO5: Explore various advanced concepts in Android Platform

UNIT - I: INTRODUCTION TO ANDROID PLATFORM
Overview(Why Android?, Features, Applications, History), Environment Setup, Architecture, Emulator, Dalvik Virtual Machine, Application Components, Resources, Manifest File, Android Application Life Cycle- Activities, Activity Life Cycle, States and its Monitoring. Services-Services states and Lifecycle

UNIT - II: ANDROID USER INTERFACE
UI Components: View, TextView, ImageView, Button, EditText, Spinner, CheckBox, RadioButton, RatingBar, Switch, SeekBar, SearchView etc.
Measurements: Device and pixel density independent measuring units.
UI Layouts: Linear, Relative, Constraint, Grid and Table Layouts. Styles and Themes.
Event Handling: Handling clicks or changes of various UI components.
Fragments: Creating fragments, Lifecycle of fragments, Types of fragments Fragment states.

UNIT - III: INTENTS AND BROADCASTS
Intents – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, using Intent to dial a number and to send an SMS.
Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity**.**
Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT-IV: DATA STORAGE
Shared Preferences: Creating shared preferences, saving and retrieving data using Shared Preference.
Files: Using application specific folders and files, creating files, reading data from files, listing contents of a directory.
Database: Introduction to SQLite database, creating and opening a database, creating tables, inserting, retrieving and deleting data. Content Providers-Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

UNIT- V: ADVANCED TOPICS
Location Based Services-Finding Current Location and showing location on the Map, updating location, RSS Feeds, Alarms, Using Camera, Gestures, Integrating PHP/MYSQL.
Using Internet Resources – Connecting to internet resource, using download manager. Publishing Android Application.

TEXT BOOKS:

1. Reto Meier, "Professional Android 4 Application Development", Wiley India (Wrox), 2012.
2. James C Sheusi, "Android Application Development for Java Programmers", Cengage Learning, 2013.

REFERENCES:

1. Wei-Meng Lee, "Beginning Android 4 Application Development", Wiley India (Wrox), 2013
2. https://developer.android.com/index.html
3. https://www.tutorialspoint.com/android/index.htm

B.Tech. (VI Sem.) 17CI16 - DATA MINING AND DATA WAREHOUSING

L	T	P	Cr.
2	2	-	3

Prerequisite: Student should possess the knowledge of DBMS and basic mathematics.

Course Educational Objective (CEO): Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining. They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Outline the basic concepts of data warehouse & data mining.
CO2: Apply data pre-processing, generalization and data characterization techniques to provide suitable input for a range of data mining algorithms.
CO3: Analyze and provide solutions for real world problems using association mining techniques.
CO4: Understand and apply various classification algorithms
CO5: Examine various clustering algorithms and applications of data mining in real life

UNIT – I

Data Mining: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

Data Warehouse : Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

UNIT – II

Data Mining Primitives, Languages, And System Architectures: Data Pre-processing: Needs Pre-processing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Data Mining Query Languages, Concepts Description, Characterization and Comparison: Data Generalization and Summarization based Characterization, Analytical Characterization, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

UNIT – III

Association Rule Mining: Frequent patterns, Apriori algorithm, and FP Growth algorithm. Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from transaction Databases, Mining Multidimensional Association Rules from Relational Databases, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT –IV

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Support Vector Machines, Classification Based on Concepts from Association Rule Mining, Rule based induction algorithm, Prediction, Classifier Accuracy.

UNIT-V

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

Applications and Trends in Data Mining: Overview of Data Mining Applications

Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining.

TEXT BOOK/S

1. Jiawei Han, Micheline Kamber ,Data Mining Concepts and Techniques, 2/e, 2006 , Elsevier Publisher (I to V Units).
2. GK Gupta , Introduction to Data Mining with Case Studies, 2/e, Prentice Hall of India Pvt Limited 2006 (V Unit-Web Mining)

REFERENCES

1. Pang-Ning tan, **Michael Steinbach, Vipinkumar** , Introduction to Data Mining, Addision-Wesley.
2. Margaret H. Dunham, **Data Mining Introductory and advanced topics**, Pearson Education
3. ArunK Pujari, **Data Mining Techniques**, University Press.
4. https://www-users.cs.umn.edu/~kumar001/dmbook/index.php
5. https://onlinecourses.nptel.ac.in/noc18_cs14/preview

B.Tech. (VI Sem.)	17EC22 - MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	Cr.
		3	-	-	3

Pre-requisites : Digital Circuits, Computer organization

Course Educational Objective : In this course student will learn about the Architecture of 8086 Microprocessor and 8051 Microcontroller and their Assembly Language Programming, interfacing Memory and Various Peripherals with 8086 Microprocessor/8051 Microcontroller and concepts of Interrupts and Serial Communication in reference to 8086

Course Outcomes (COs): At the end of the course, students will be able to

CO1:	**Understand** the architecture and operation of 8086 microprocessor & 8051 microcontroller
CO2:	**Apply** the instructions of 8086/8051 for various applications.
CO3:	**Analyze** the operation of peripherals and devices for different applications.
CO4:	**Design** a system by interfacing memory, peripherals and I/O devices to 8086/8051

UNIT – I

Microprocessor Architecture: Introduction to Microprocessors-Purpose of a Microprocessor, different types of Microprocessors, their features and their comparison; 8086 Microprocessor-Architecture , Special functions of General purpose registers, 8086 flag register and function of 8086 Flags, Addressing modes of 8086.

Instruction Set: Instruction set of 8086, Assembly language programs involving logical, Branch and Call instructions, Sorting, Evaluation of Arithmetic Expressions, String manipulation, Assembler directives, simple programs, procedures and macros.

UNIT – II

8086 Memory and I/O Interfacing: Pin diagram of 8086, Minimum mode and maximum mode of operation, Timing diagram, Memory (Static RAM & EPROM) and I/O interfacing to 8086. Interrupt structure of 8086, Interrupt Vector table, Interrupt service routines.

UNIT – III

Peripherals and Devices: DMA Controller 8237, Interrupt Controller 8259 and Cascading, USART 8251 8255 PPI – various modes of operation, Keyboard, D/A and A/D converter interfacing.

UNIT – IV

Microcontroller: 8051 Microcontroller Architecture, Pin Diagram, Addressing modes, Instruction Set and Programs, 8051 Memory and I/O interfacing .

UNIT – V

8051 Interfacing: Modes of timer operation, Serial port operation, Interrupt structure of 8051, Interfacing of Seven segment Displays, Stepper Motor and Serial/Parallel Printer

TEXT BOOKS

1. Douglas V. Hall, "Micro Processors & Interfacing", TMH, 2007.
2. A. K. Ray and K.M. Bhurchandi, Advanced Microprocessor And Peripherals,2nd Edition TMH Publishers.
3. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay "Microcontrollers and Embedded System", Pearson Education Publishers, 2nd Edition

REFERENCES

1. Raj Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education Publishers.
2. J. K. Uffenbeck, "The 8088 and 8086 Micro Processors", PHI, 4th Edition, 2003.
3. Ajay Deshmukh, "Micro Controllers-Theory and Applications", Tata McGraw Hill Publishers.
4. Kenneth J. Ayala, "The 8051 Micro Controller", Cengage Learning Publishers, 3rd Edition, 2000.

B.Tech. (VI Sem.)	17CI17 - DATA COMMUNICATIONS AND COMPUTER NETWORKS	L	T	P	Cr.
		3	-	-	3

Prerequisite: Basic Computer Fundamentals and Concepts

Course Educational Objective (CEO): The students will be able to Build an understanding of the fundamental concepts of computer networking and gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Outcomes (COs): After the completion of this course, student will be able to:
CO1: Understand how the data is transmitted from point-to-point.
CO2: Summarize Data Link Layer Protocols.
CO3: Analyze different Medium Access Control protocols.
CO4: Evaluate different routing protocols and Transport layer protocols.
CO5: Understand the concepts of Presentation and Application Layer Protocols

UNIT – I: INTRODUCTION:
Layered Network Architecture: Review of ISO-OSI Model, Introduction to TCP/IP Model.
Data Communication Techniques; Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM).; Multiplexing Techniques; Frequency Division, Time Division, TimeDivision Multiplexing.
Physical Layer: Transmission Media: Wires, Cables, Fibre Optic. Error Detection and Correction: Single and parity Check Codes, Cyclic Redundancy Code & Hamming Code.

UNIT – II: DATA LINK LAYER PROTOCOLS:
Stop and Wait Protocols: Noise free and Noisy channels, performance and efficiency
Sliding WindowProtocols: Go Back and Selective Repeat ARQ, performance and efficiency, verification of protocol, HDLC data link protocol

UNIT - III: MEDIUM ACCESS CONTROL SUB LAYER:
Concept of Random Access, Pure ALOHA, throughput characteristics of ALOHA, Throughputs for finite and infinite populations, S-ALOHA.
LAN: IEEE 802.3, 802.4 and 802.5 Protocols, performance of Ethernet. Token Ring Protocol, FDDI Protocol, General Principles, Virtual circuits and datagram's, Windows flow control, Packet Discarding, Traffic Shaping, Choke RSVP, Internetworking using Bridge, Routers and Gateways,

UNIT – IV: NETWORK AND TRANSPORT LAYER PROTOCOLS:
Routing Algorithms: Optimality principle, shortest path routing - Dijkstra, Flooding and broadcasting, distance vector routing, link state routing, flow based routing, Multicasting routing flow and congestion control. Internet Architecture and Addressing.
Transport Layer: Design issues, Quality of Services, Primitives Connection Management: Addressing, Connection Establishment and Releases. Flow control and Buffering, Crash recovery, Element of TCP/IP protocol: User Data gram Protocol (UDP).

UNIT – V: PRESENTATION AND APPLICATION LAYER PROTOCOLS:
Distributed Applications: Electronic Mail, SMTP, and HTTP.
Overview Cryptography: Substitutions and Transposition Ciphers, Data Encryption Standard (DES), RSA algorithm.

TEXT BOOKS

1. A. S. Tanenbaum "Computer Network: Second Ed. Prentice Hall, India (tan).
2. B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

REFERENCES

1. D. Berekas an R. Gallager, "Data Networks:, second Ed. Prentice Hall, India.
2. D. E. Coner, "Intertworking with TCP/IP", Vol-I.Prentice Hall India.
3. G. E. Keiser, "Local Area Network", Mc Graw Hill, International Ed.
4. W. Stalling, "Data & Computer Communications", Maxwell Macmillan Internation Ed.
5. http://web.mit.edu/dimitrib/www/datanets.html
6. http://www.dop.nsysu.edu.tw/files/news/949_d40aaff4.pdf

L	T	P	Cr.
3	-	-	3

B.Tech. (VI Sem.) **17CS06 - SWIFT PROGRAMMING**

Prerequisite: Knowledge in C Programming

Course Educational Objective (CEO): The objective of this course is to write classes and add functionality to classes by writing and calling methods. After learning some basic Objective-C syntax, students will examine and break down an app written in Objective-C and rewrite it in Swift.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Identify the basic programming constructs of swift programming.

CO2: Develop programs using operators and strings.

CO3: Develop programs using composite Data types and control statements.

CO4: Write modular programs using functions and closures.

CO5: Apply enumerations and classes in swift to develop programs.

UNIT – I:

Introduction to Swift: SimpleValues, ControlFlow, Functions and Closures, Objects and Classes, Enumerations and Structures, Protocols and Extensions, Generics.

Language Guide: The Basics: Constants and Variables, Comments, Semicolons, Integers, Floating-Point Numbers, Type Safety and Type Inference, Numeric Literals, Numeric Type Conversion, Type Aliases, Booleans, Tuples, Optionals, Assertions

UNIT - II:

Basic Operators: Assignment Operator, Arithmetic Operators, Compound Assignment Operators, Comparison Operators, Ternary Conditional Operator, Nil Coalescing Operator, Range Operators, Logical Operators.

Strings and Characters: String Literals, Initializing an Empty String, String Mutability, Strings Are Value Types, Working with Characters, Concatenating Strings and Characters, String Interpolation, Unicode, Counting Characters, Accessing and Modifying a String, Comparing Strings, Unicode Representations of Strings

UNIT- III:

Collection Types: Mutability of Collections, Arrays, Sets, Performing Set Operations, Dictionaries.

Control Flow: For Loops, While Loops Do-While.

Conditional Statements: If, Switch, Where.

Control Transfer Statements: Continue, Break and Fall through.

UNIT - IV:

Functions: Defining and Calling Functions, Function Parameters and Return Values, Function Parameter Names, Function Types, Nested Functions.

Closures: Closure Expressions, Trailing Closures, Capturing Values, Closures Are Reference Types.

UNIT - V:

Enumerations: Enumeration Syntax, Matching Enumeration Values with a Switch Statement, Associated Values, Raw Values.

Classes and Structures: Comparing Classes and Structures, Structures and Enumerations Are Value Types; Classes Are Reference Types, Choosing Between Classes and Structures, Assignment and Copy Behaviour for Strings, Arrays, and Dictionaries.

TEXTBOOK:

1. "The Swift Programming Language (Swift 4.0.3)", Apple Inc.

REFERENCES:

1. Matthew Mathias & john Gallagher, "Swift Programming, The Big Nerd Ranch Guide", Big Nerd Ranch.
2. Wei-Meng Lee, "Beginning Swift Programming", Wiley.
3. https://developer.apple.com/swift/
4. https://www.tutorialspoint.com/swift/index.htm

B.Tech. (VI Sem.)	17CS07 - SCALA PROGRAMMING	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge in Object Oriented Programming

Course Educational Objective (CEO): The objective of this course is to become a competent user of Scala and be able to apply the functional programming style in Scala, and know how to use fundamental Scala tools.

Course Outcomes (COs): After the completion of this course, student will be able to:
CO1: Identify the basic programming constructs of scala programming.
CO2: Develop programs using classes and operators to solve real world problems.
CO3: Apply functional objects and control structures to develop applications.
CO4: Write modular programs using Functions and Closures.
CO5: Demonstrate & Implement inheritance concept in scala.

UNIT - I:
Introduction: A Scalable Language: A language that grows on you, what makes Scala scalable? Why Scala? , Scala's roots.
First Steps in Scala: Learn to use the Scala interpreter, Define some variables, define some functions, Write some Scala scripts, Loop with while; decide with if, Iterate with foreach and for.
Next Steps in Scala: Parameterize arrays with types, Use lists, Use tuples, Use sets and maps, Learn to recognize the functional style, Read lines from a file.

UNIT - II:
Classes and Objects: Classes, fields, and methods, Semicolon inference, Singleton objects, A Scala application, The Application trait.
Basic Types and Operations: Some basic types, Literals, Operators are methods, Arithmetic operations, Relational and logical operations, Bitwise operations, Object equality, Operator precedence and associativity, Rich wrappers

UNIT - III:
Functional Objects : A specification for class Rational, Constructing a Rational, Implementing the toStringmethod, Checking preconditions, Adding fields, Self references, Auxiliary constructors, Private fields and methods, Defining operators, Method overloading , Implicit conversions, A word of caution.
Built-in Control Structures: If expressions, While loops, for expressions, Exception handling with try expressions, Match expressions, Living without break and continue, Variable scope, Refactoring imperative-style code

UNIT-IV:
Functions and Closures: Methods, Local functions, First-class functions, Short forms of function literals, Placeholder syntax, partially applied functions, Closures, Special function call forms, Tail recursion.
Control Abstraction: Reducing code duplication, simplifying client code, Currying, Writing new control structures, By-name parameters

UNIT - V:

Composition and Inheritance: A two-dimensional layout library, Abstract classes, Defining parameter less methods, Extending classes, Overriding methods and fields, Defining parametric fields, Invoking super class constructors, Using override modifiers, Polymorphism and dynamic binding, Declaring final members, Using composition and inheritance, Implementing above, beside, and toString, Defining a factory object, Heighten and widen, Putting it all together

TEXTBOOK:

1. Martin Odersky, Lex Spoon & Bill Venners, "Programming in Scala, A Comprehensive step by step guide", Artima, 2nd Edition.

REFERENCES:

1. Dean Wampler& Alex Payne, "Programming Scala", O'Reilly, 2nd Edition.
2. Thomas Alexandre, "Scala for Java Developers", Packt.
3. https://www.tutorialspoint.com/scala/index.htm
4. https://www.scala-lang.org/

B.Tech. (VI Sem.)	17CS08 - PHP PROGRAMMING	L	T	P	Cr.
		3	-	-	3

Prerequisite: Students should have the knowledge of OOP language, web technologies.

Course Educational Objective (CEO): The main objective of the course is that the studentswill gaintheknowledge necessary to design and develop dynamic, database-driven Web applications using ***PHP***.

Course Outcomes (COs): After the completion of this course, student will be able to:
CO1: Identify the basic programming constructs of PHP.
CO2: Develop programs using functions, strings and arrays.
CO3: Apply object oriented principles in PHP.
CO4: Design interactive web pages by using JQuery & AJAX.
CO5: Design data driven applications by using PHP.

UNIT – I: INTRODUCTION TO PHP:
Introduction to PHP: History, Web Browser, Web Server – Xampp, Installation and Configuration files. Evaluation of PHP, Basic syntax, Defining variable and constant, PHP Data types, Operators and Expressions.
Decisions and loops: Making Decisions, doing Repetitive task with looping, Mixing decisions and looping with HTML.

UNIT – II: FUNCTIONS, STRING & ARRAY:
Functions: What is a function, Define a function, Call by value and Call by reference and Recursive functions.
String: Creating and accessing String, Searching & Replacing String, Formatting String, String Related Library functions
Array: Anatomy of an Array, Creating Index based and Associative array, Accessing array element, Looping with Index based array, Looping with associative array using each() and foreach(), some useful library functions.

UNIT – III: ADVANCE PHP:
Introduction: Objects, Declaring a class, the new keyword and constructor, Destructor, Access method and properties using $this variable. Public, private, protected properties and methods, Static properties and method, Class constant, Inheritance & code, reusability, Polymorphism, Parent::& self:: keyword, Instance of operator, Abstract method and class, Interface, Final.
Exception Handling: Understanding Exception and error. Try, catch, and throw.

UNIT – IV: PHP SCRIPT:
JQuery: Introduction to JQuery, Validation using JQuery, JQuery Forms, JQuery Examples.
AJAX: Introduction to AJAX, PHP with AJAX, Working with database.

UNIT – V: PHP WEB SERVICES:
Handling HTML form with PHP: Capturing Form Data, Dealing with Multi-value file, generating File uploaded form, redirecting a form after submission.
Web Features: Sessions, Forms GET and POST data, Cookies, HTTP Headers.
Database Connectivity with MySQL: Introduction to RDBMS, Connection with MySQL Database, Performing basic database operations (DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query.

TEXTBOOKS:

1. Steven Holzner, "PHP: The Complete Reference", McGraw-Hill Education, 2007.(Unit 1 to 5)
2. Kevin Tatroe, Peter MacIntyre, RasmusLerdorf, "Programming in PHP", O'Reilly, 3rd Edition, 2013. (Unit 1,2 & 5)
3. Luke Welling, Laura Thomson, "PHP and MySQL Web Development",Pearson Education, 5th Edition. (Unit 5)

REFERENCES:

1. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery DT Editorial Services Dreamtech Publications
2. Lynn Beighley, Michael Morrison, "Head First PHP & MySQL: A Brain-Friendly Guide", O'Reilly, 1st Edition.
3. David Powers, "PHP Solutions: Dynamic Web Design Made Easy, Apress, 3rd Edition.
4. https://www.w3schools.com/php/php_intro.asp
5. https://www.tutorialspoint.com/php/php_introduction.htm
6. https://www.tutorialrepublic.com/php-tutorial/php-variables.php

B.Tech. (VI Sem.)	17CS09 - GOOGLE GO PROGRAMMING	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge on Basics of C Programming and JAVA Programming

Course Educational Objective (CEO): The main objective of this course is that a student will be familiar with Go Programming environment which helps to solve simple Mathematical Problems and carrying out Modular Programming using Functions. Student understands Memory Management using Pointers, different Methods and its declarations which help them in developing real time applications such as Chat Server, Web Crawler and more.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Identify the basic programming constructs of Google Go.

CO2: Develop programs using Composite Data Types like Arrays, Slices, Maps and Various Operations.

CO3: Write Modular Programs using Functions.

CO4: Understand and implement the concepts of Memory Management using Pointers and Methods.

CO5: Apply Various Operations on Interfaces.

UNIT - I:Introduction:

Differences between Go and C, Why Go?, The Go Type System, Understanding the Memory Model, The Structure of a Go Source File

Program Structure: Names, Declarations, Variables, Assignments, Type Declarations, Packages and Files, Scope.

UNIT - II: TYPES:

Basic Data Types: Integers, Floating-Point Numbers, Complex Numbers, Booleans, Strings, Constants.

Composite Data Types: Arrays, Slices, Maps, Structs, JSON, Text and HTML Templates.

UNIT - III: FUNCTIONS:

Function Declarations, Recursion, Multiple Return Values, Errors, Function Values, Anonymous Functions, Variadic Functions, Deferred Function Calls, Panic, Recover.

UNIT- IV: POINTERS AND METHODS:

Pointers: Introduction to Pointer, The * and & Operator, new( ) function

Methods: Method Declarations, Methods with a Pointer Receiver, Composing Types by Struct Embedding, Method Values and Expressions, Example: Bit Vector Type, Encapsulation.

UNIT – V: INTERFACES:

Interfaces as Contracts, Interface Types, Interface Satisfaction, Parsing Flags with *flag.Value*, Interface Values, Sorting with *sort.Interface*, The *http.Handler Interface*, The error Interface, Example: Expression Evaluator, Type Assertions, Discriminating Errors with Type Assertions, Querying Behaviors with Interface Type Assertions, Type Switches, Example: Token-Based XML Decoding.

TEXTBOOKS:

1. David Chisnall, "The Go Programming Language Phrasebook", Addison Wesley, USA, ISBN-13: 978-0321817143, 2012. (Unit–1: Introduction)
2. Alan A. A. Donovan, Brian W. Kernighan, "The GO Programming Language", ADDISON-WESLEY PROFESSIONAL COMPUTING SERIES, USA, ISBN-13:978-0-13-419044-0, 2016. (Unit-1: Program Structure to Unit-5)

REFERENCES:

1. Caleb Doxsey, "An Introduction to Programming in Go", CreateSpaceIndependent | Publishing Platform, ISBN: 978-1478355823, 2012.
2. Eleanor McHugh, "A Go Developer's Notebook", Leanpub, 2016.
3. Karl Seguin, "The Little Go Book", github.com/karlseguin/the-little-go-book
4. Matt Aimonetti, "GO BOOTCAMP", http://www.golangbootcamp.com/book
5. https://www.tutorialspoint.com/go/index.htm
6. https://gobyexample.com/

L	T	P	Cr.
-	-	2	1

B.Tech. (VI Sem.) **17CS63 - ANDROID TECHNOLOGIES LAB**

Prerequisite: Knowledge in Java Programming

Course Educational Objective (CEO): This course facilitates students develop competence and confidence in android programming and understand the entire Android Apps Development Cycle, as well as it would also enable the students to independently create new Android Applications

Course Outcomes (COs): After the completion of this course, student will be able to:
CO1: Design basic Android Applications.
CO2: Develop applications that interact with SQLite Database.
CO3: Design applications that make use of Advanced Android Concepts.

1. Design a Birthday Card Application using Relative Layout.
2. Develop an Android Application that demonstrates Android Application Life Cycle.
3. Develop an Android Application that Starts and Stops a Service.
4. Develop an application that uses GUI components, Font and Colours.
5. Develop an application that demonstrates Tab Navigation
6. Develop an application that uses Layout Managers and event listeners.
7. Develop Temperature Conversion Application.
8. Develop an Android Application that creates a Calculator.
9. Develop an Android Application that demonstrates Explicit Intents.
10. Develop an Android Application that demonstrates Implicit Intents.
11. Develop an Application that demonstrates Broadcast Receivers.
12. Develop an Order Form Application that sends order summary to Mail using Implicit Intents.
13. Develop a Court Counter Application that Counts Scores of two Teams.
14. Develop an Application that demonstrates Alert Dialogs in Android
15. Develop an Application that demonstrates Intent Share in Android
16. Develop an Application that Saves data using Shared Preferences
17. Develop an Application that Saves data using SQLite Database.
18. Develop an Application that demonstrates Content Providers in Android
19. Develop an Application that sends a Notification Message.
20. Develop an Application that demonstrates Date and Time Picker Dialog
21. Develop an Application that shows current location in Google Maps
22. Develop an Application that reads RSS Feeds
23. Develop an Application that makes use of Camera
24. Develop an Application that makes use of User Gestures.
25. Develop an Application that makes use of WebView Layout to Connect to Web Resource.

REFERENCES:

1. https://developer.android.com/index.html
2. https://github.com/codepath/android_guides/wiki/Sample-Android-Apps
3. https://www.tutorialspoint.com/android/index.htm
4. http://www.sanfoundry.com/java-android-programing-examples/

B.Tech. (VI Sem.)	17CI67 - DATA MINING AND DATA WAREHOUSING LAB	L	T	P	Cr.
		-	-	2	1

Prerequisite: Understanding of various Data Mining Algorithms.

Course Educational Objective (CEO): Students will use existing commercial or public-domain tools to perform data mining tasks to solve real world problems in various domains.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Understand the need of data mining and the details of different algorithms made available by popular commercial data mining software.

CO2: Solve real data mining problems by using the right tools to find interesting Patterns and obtain hands-on experience with some popular data mining software.

CO3: Examine some real time Applications and obtain the results using various Data Mining Algorithms.

S. No.	Name of the Experiment
1.	Importing datasets from various repositories such as UCI, CMU to WEKA, R-Tool.
2.	**APRIORI & FP-GROWTH Algorithms**
	Implementation of Association Rule Mining using C++ / JAVA Programming.
	Verification of Association Rule Mining Results using WEKA Tool / R-Tool
3.	Decision Tree, KNN and Naive Baye's classifier Algorithms (Supervised Learning)
	Implementation of various Classification Techniques using C++ / JAVA Programming.
	Verification of Classification Results using WEKA Tool / R-Tool
4.	**K-Means and Hierarchical Clustering Algorithms(Un-Supervised Learning)**
	Implementation of various Clustering Techniques using C++ / JAVA Programming.
	Verification of Clustering Results using WEKA Tool / R-Tool
5.	Case Study-1
6.	Case Study-2

L	T	P	Cr.
-	-	2	1

B.Tech. (VI Sem.) **17FE61 - PRESENTATION SKILLS LAB**

Pre-requisites: Students should have fundamental knowledge in making Conversations in English and be with readiness to speak

Course Educational Objective: To help students make oral presentations, power point presentations, participate in group discussions and Write project/research reports/technical reports/ formal letters by gathering information and organizing ideas relevantly and coherently.

Course Outcomes: At the end of the course, the student will be able to
CO1: Make power point presentations and oral presentations.
CO2: Use standard vocabulary contextually.
CO3: Manage skilfully through group discussions.
CO4: Negotiate skilfully for better placement.

Syllabus: English Communication Skills Lab (ELCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems, LAN facility and English language software for self- study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorder etc.

Exercise – I
CALL Lab:
Understand: synonyms and antonyms, one-word substitutes, analogy, idioms and phrases.
ICS Lab:
Practice: Ice-Breaking Activity and JAM Session – Introducing Oneself – Extempore - Public Speeches.

Exercise – II
CALL Lab:
Understand: Features of Good Conversation – Strategies for Effective Communication.
ICS Lab: Group Discussion

Exercise – III
CALL Lab:
Understand: Data collection – Organizing data - Making Poster – Making slides.
ICS Lab:
Practice: Poster Presentation – Power Point Presentations.

Exercise – IV
CALL Lab:
Understand: Types of Résumé – Letter Writing.
ICS Lab:
Practice: Writing Résumé & Letters

Exercise – V
CALL Lab:
Understand: Reading comprehension – Listening Comprehension – scanning, skimming, reading between lines and critical reading.

ICS Lab:
Practice: Reading comprehension - Listening Comprehension – scanning, skimming, reading between lines and critical reading.

Exercise - VI
CALL Lab:
Understand: Interview Skills
ICS Lab:
Practice: Mock Interviews

Lab Manual:
Board of Editors, "ELCS Lab Manual – A Workbook of CALL and ICS Lab Activities", Orient Black Swan Pvt. Ltd., Hyderabad, 2016.

SUGGESTED SOFTWARE:
1. Digital Mentor: Globarena, Hyderabad, 2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley, USA, 2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, The Learning Company, USA, 2002
6. Learning to Speak English - 4 CDs. The Learning Company, USA,2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi, 2008

L	T	P	Cr.
-	-	2	1

B.Tech. (VI Sem.) **17PD07 - SEMINAR**

Pre-Requisites: Basic knowledge in Report writing and presentation skill.

Course Educational Objective: The main objective of Seminar is to acquire the insightful knowledge in current trends in the field of computer science and engineering and to improve oral presentation and report writing skills.

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

CO1: Understand and Acquire in depth knowledge in modern technologies, tools and systems in the field of Computer Science and Engineering.

CO2: Analyze complex engineering problems which are relevant to the society and industry.

CO3: Excelin communication skills and presentation skills.

B.Tech. (VI Sem.)	17PD08 - EMPLOYABILITY ENHANCEMENT SKILLS – II	L	T	P	Cr.
		1	-	-	0

Prerequisite: NIL

Course Educational Objective (CEO): This course will make students proficient in Quantitative techniques, language & communication skills to qualify in placement tests, demonstrate industry-readiness skills by applying concepts and tools that will serve as building blocks for analytical thinking and professional development.

Course Outcomes (COs): After the completion of this course, student will be able to:
CO1: To identify, analyze and apply quantitative techniques related to qualify in Placement tests.
CO2: To effectively utilize verbal ability & communication skills to qualify in Placement tests.
CO3: To effectively communicate in professional as well as social contexts.
CO4: To apply key soft skills effectively in Job Interviews as well in other professional contexts
CO5: Inculcate lifelong learning through personal effectiveness as well as leadership.

UNIT – I:
Verbal Ability: Tenses& Conditional Clauses
Quantitative Aptitude: Alligation or Mixture**,** Simple Interest and Compound Interest

UNIT – II:
Verbal Ability: Sentence Completions
Quantitative Aptitude: Time and work, Pipes and Cistern, Permutations and Combinations, Probability

UNIT – III:
Verbal Ability: Spot the Errors
Quantitative Aptitude: Time and Distance, Problems on trains,Boats and Streams, Races and Games of Skill

UNIT – IV:
Verbal Ability: Jumbled Sentences, Cloze Tests
Quantitative Aptitude: Area, Volume and Surface Areas, Progressions

UNIT – V:
Verbal Ability: Advanced Reading Comprehension
Quantitative Aptitude: Clocks and Calendars, Cubes and Dice

TEXT BOOKS:
1. Objective Arithmetic, S. CHAND Publishers.
2. R.S.AGGARWAL, *Verbal & Non-Verbal Reasoning*, S. CHAND Publishers.
3. Objective English. Edgar Thorpe, Pearson Education, New Delhi.2009.
4. Sanjay Kumar, PushpaLata: Communication skills. Oxford, Delhi, 2012.
5. Vocabulary Builder for Students of Engineering and Technology (A self – study manual for vocabulary Enhancement) Y.Saloman Raju, Maruthi Publishers

REFERENCES:

1. Meenakshi Raman, Sangeetha: Technical Communication, Oxford University Press, 2008
2. Baron's Guide on GRE
3. Dinesh Khattar, *The Pearson Guide to Quantitative Aptitude*, Pearson Education
4. M. Tyra, *Magical Book on Quicker Maths*, BSC Publishers
5. Quantitative Aptitude by Arun Sharma
6. Vocabulary Builder for Students of Engineering and Technology (A self – study manual for vocabulary Enhancement) Y.Saloman Raju, Maruthi Publishers

B.Tech. (VI Sem.)	17CS91 - SOFTWARE TESTING METHODOLOGIES (Add on course – II)	L	T	P	Cr.
		3	-	-	3

Prerequisite: Software Engineering and UML.

Course Educational Objective (CEO): The primary objective of this course is to know the importance of automation testing compared with manual testing and importance of testing in real life while developing any product/project which reduces the risk of a developer. To know how to prepare testing techniques by using flow graph, transition flows and reduction of path expressions. To study fundamental concepts in software testing including software testing objectives, process, criteria, strategies, and methods.

Course Outcomes (COs): After the completion of this course, student will be able to:

CO1: Interpret a model for testing and understand the process of testing.

CO2: Visualize control flow graph and demonstrate complete path testing to achieve C1+C2 and identify the complications in a transaction flow testing and anomalies in data flow testing.

CO3: Apply domain testing strategies for different domains.

CO4: Apply reduction procedures to control flow graph and simplify it into a single path expression and understand the use of decision tables in test case design.

CO5: Identify effective approach for node reduction.

UNIT – I:

Introduction: Purpose of Testing, Dichotomies, model for testing, consequences of bugs, Taxonomy of bugs.

UNIT – II:

Flow Graphs and Path testing: Basic concepts, Predicates, Path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

Transaction flow testing: Transaction flows, transaction flow testing techniques.

Data flow testing: Basics of Data flow testing, strategies in dataflow testing, application of dataflow testing

UNIT – III:

Domain Testing: Domains and paths, Nice and ugly domains, domain testing, domains and interfaces testing, domains and testability

UNIT – IV:

Paths, path products and Regular expressions: Path products & Path expression, reduction procedure, applications, regular expressions and flow anomaly detection.

Logic Based Testing: Overview, decision tables, path expressions, kv charts, specifications

UNIT – V:

State, state graphs and Transition Testing: State Graphs, good and bad state graphs, state testing, testability tips.

Graph matrices and Application: Motivational overview, matrix of graph relations, power of a matrix, node reduction algorithm, building tools.

TEXTBOOK:

BorisBeizer; "Software Testing Techniques"; International Thomson computer Press, Second edition.

REFERENCES:

1. Brain Marick; "The Craft of Software Testing"; Prentice Hall Series in innovative technology.
2. RenuRajaniPradeep Oak; "Software Testing,Effectivemethods,Tools and Techniques";TMHI
3. Dr.K.V.K.K.Prasad, "Software Testing Tools" –Dreamtech.
4. Edward Kit, "Software Testing in the Real World" –Pearson.
5. Perry, "Effective methods of Software Testing", John Wiley.
6. https://www.youtube.com/watch?v=gPE9emPFrwo
7. https://freevideolectures.com › Computer Science › IIT Bombay
8. NPTEL videos : https://nptel.ac.in/courses/106105150

B.Tech. (VII Sem.)	17CI18 - BIG DATA ANALYTICS	L	T	P	Cr.
		2	2	-	3

Prerequisite: Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment.

Course Educational Objective (CEO): This subject aims to provide students with the knowledge of current challenges, methodologies and technologies in processing big data. Emphasis will be placed on the students' understanding of the rationales behind the technologies and the students' ability to analyse big data using professional software packages like Hadoop and R.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Identify Big Data and its Business Implications.
CO2: Access and Process Data on Distributed File System.
CO3: Manage Job Execution in Hadoop Environment.
CO4: Develop Big Data Solutions using Hadoop Eco System.
CO5: Apply Machine Learning Techniques using R.

UNIT – I: INTRODUCTION TO BIG DATA:
Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating- The Promotion of the Value of Big Data - Why Big Data, overview of Big Data, issues and challenges of Big Data, stages of analytical evolution, State of the Practice in Analytics , The Data Scientist , Big Data Analytics in Industry Verticals , Data Analytics Lifecycle , Discovery , Data Preparation , Model Planning and building, Communicating Results , Operationalzing. Basic Data Analytic Methods Using R. Big Data Use Cases- Characteristics of Big Data Applications.

UNIT – II:
Technologies and Tools, Analytics for Unstructured Data - MapReduce and Hadoop. The design of HDFS, HDFS concepts, Command line interface to HDFS, Hadoop File system Interfaces, Java Interface to Hadoop, Anatomy of a file read, Anatomy of a file write, Replica placement and Coherency Model, Parallel copying with distcp, keeping an HDFS cluster balanced. Advantages of Hadoop and HDFS. Big data Technological approaches and Potential use cases for Big Data. Clustering, Regression

UNIT – III:
Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT – IV: HADOOP ECO-SYSTEM:
Big Data Analytics - Demos, Hadoop and the Amazon Cloud, Query languages for Hadoop, Spreadsheet-like analytics, Stream Computing
Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.
Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.
Hbase:HBasics, Concepts, Clients, Example, HbaseVersus RDBMS.
Big SQL: Introduction

UNIT-V: DATA ANALYTICS WITH R:

In-database Analytics – SQL Essentials, Advanced SQL and MADlib for In-database Analytics, The Endgame, or Putting it All Together, Operationalizing an Analytics Project, Data Visualization Techniques. Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering, Big Data Analytics with BigR. Data models for managing big data, Real-time streaming data analytics , Scalable analytics on large data sets , Systems architecture for big data management, Main memory data management techniques

TEXTBOOKS:

1. Data Science and Big Data Analytics – Discovering, Analysing, Visualizing and presenting data – EMC Education Services, EMC2, Wiley Publications, 2015.
2. Tom White "Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
3. Seema Acharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015

REFERENCES:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013).
3. AnandRajaraman and Jefrey David Ulman, "Mining of Massive Datasets", Cambridge University Press,2012.
4. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012, 2001.
5. http://nptel.ac.in/courses/106104135/48
6. http://nptel.ac.in/courses/110106064/

B.Tech. (VII Sem.)	17CI19 - INTERNET OF THINGS	L	T	P	Cr.
		2	2	-	3

Prerequisite: Python programming

Course Educational Objective (CEO): The objective of this course is to explore the interconnection and integration of the physical world and the cyber space. Understand the design concepts in setting up IOT Devices. Study about the setup, configuration and installation of equipment for IOT.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Understand Device-processor communication models & protocols.
CO2: Understand the application areas of IOT.
CO3: Visualize the effect of internet on Mobile Devices, Cloud & Sensor Networks.
CO4: Acquire programming experience with Raspberry Pi kit to interface various devices.
CO5: Implement Programming models for IoT Cloud Environment.

UNIT - I:
Introduction to Internet of Things: Introduction, Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabled Technologies, IoT Levels and Deployment Templates

UNIT - II:
Domain Specific IoTs: Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle

UNIT - III:
IoT AND M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT
IoT System Management: Need for IoT Systems Management, SNMP, NETCONF, YANG, YANG-NETCONF, NETOPEER.

UNIT - IV:
IoT Physical Devices & Endpoints: What is an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces (Serial, SPI, and I2C), Programming Raspberry Pi with Python, Other IoTDevices

UNIT - V:
IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework – Django, Designing a RESTful Web API.

TEXTBOOKS:
1. ArshdeepBahga and Vijay Madisetti, “Internet of Things - A Hands-on Approach”, Universities Press, 2015, ISBN: 9788173719547.
2. Matt Richardson & Shawn Wallace, O'Reilly (SPD),”Getting Started with Raspberry Pi”, 2014, ISBN: 978935023975.

REFERENCES:

1. Pethuru Raj and Anupama C. Raman,"The Internet of Things: Enabling Technologies, Platforms, and Use Cases", (CRC Press).
2. Adrian McEwen, “Designing the Internet of Things”, Wiley Publishers, 2013, ISBN: 978-1-118-43062-0.
3. Daniel Kellmereit, “The Silent Intelligence: The Internet of Things”, 2013, ISBN: 0989973700.
4. https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf. http://nptel.ac.in/courses/106105166

B.Tech. (VII Sem.)	17CI20 - INFORMATION SECURITY	L	T	P	Cr.
		2	2	-	3

Prerequisite: Principles of Computer networks, Data transfer mechanisms in Internet. Security aspects in Internet and Data communication networks and storage media.

Course Educational Objective (CEO): This course elevates the security aspects and provides the knowledge to understand the basic concept of Cryptography and Network Security principles. It antilight's different types of cipher mechanisms and various symmetric and asymmetric algorithms. Also provides the knowledge on digital signatures, different threats, viruses, intruders and firewalls.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Evaluate the use of encryption algorithm for achieving data confidentiality
CO2: Apply Secure hash functions for attaining data integrity
CO3: Analyse the security mechanisms for achieving authentication
CO4: Analyse the protocols for achieving availability, access control to resources and protocols for non-repudiation
CO5: Explore the threats and remedial measures for system security.

UNIT - I: INTRODUCTION:
Security Attacks(Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication,Integrity, Non-repudiation, Access Control and Availability) and Mechanisms. A Model for Internetwork security, Conventional Encryption Principles,Conventional Encryption Algorithms (DES,Triple DES and AES),Cipher Block Modes of Operations (CBC,CFB only),Stream Ciphers and RC4, Location of Encryption Devices,Key Distribution.

UNIT - II: PUBLIC -KEY CRYPTOGRAPHY:
Approaches of Message Authentication, Secure Hash Functions (SHA-1, SHA-512) and HMAC Algorithm, Public Key Cryptography principles, Public Key Cryptography Algorithms, Digital Signatures, Public Key Infrastructure, Digital Certificates, Certificate Authority, Key Management,Kerberos,X.509 Directory Authentication Service.

UNIT - III: EMAIL PRIVACY:
Email privacy, Pretty Good Privacy (PGP), PGP and S/MIME, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange, cryptographic Suites.

UNIT - IV: WEB SECURITY:
Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET) and HTTPs.

UNIT - V: INTRUDERS:
Intruders, Viruses and Related Threats, Firewall Design principles, Trusted System, Introduction to Database Security and authorization.

TEXTBOOK

William Stallings, Network Security Essentials (Applications and Standards), Pearson Education.

REFERENCES

1. Stallings, Cryptography and Network Security, PHI/Pearson, Third edition
2. Whitman, Principles of Information Security, Thomson
3. Robert Bragg, Mark Rhodes, Network Security: The complete reference, TMH
4. Buchmann, Springer Introduction to Cryptography.
5. https://www.mat.unical.it/ianni/storage/Intro-2013.ppt
6. http://www.inf.ufsc.br/~bosco.sobral/ensino/ine5680/material-cripto-seg/2014
7. http://www.williamstallings.com/netsec/netsec4e.html
8. https://www.cs.kau.se/cs/dvgc19/ch14.pdf
9. https://www.ntut.edu.tw/~jhwang/IS

B.Tech. (VII Sem.) **17CI21 - SOFTWARE PROJECT MANAGEMENT**

L	T	P	Cr.
3	-	-	3

Prerequisite: Software Engineering, Software Testing Methodologies, Object oriented Analysis and Design.

Course Educational Objective (CEO): This course is centred on those unique aspects of software project management at three levels: Organizational and infrastructure management; project management and the management of a measurement of the Project, and how these are applied to actual software projects.

COURSE OUTCOMES (COs): After the completion of this course, the student will be able to:

CO1: Identify the basic concepts and issues of software project management, Parameters to be considered to improve the software economics.

CO2: Apply SDLC methodology for development and identification of artifacts for each lifecycle phases.

CO3: Apply activities necessary to successfully complete and close the software projects using all the checkpoints in development process.

CO4: Examine various metrics for assessing the quality and cost; Acquire knowledge about automation building blocks and organization structure.

CO5: Identify the elements of tailoring process and future software project management along with case study (CCPDS).

UNIT - I:

Conventional software Project management: Introduction, Waterfall Model, Conventional Software Management Performance.

Evaluation of software Economics: Software Economics, Pragmatic Software Cost Estimation.

Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness Improving Automation, Achieving Required Quality & Peer Inspections.

The old way and new way: Principles of Conventional Software Engineering, Principles of Modern Software Management, Transition to an iterative process.

UNIT - II:

Life cycle Phases: Engineering and Production Stages, Inception, Elaboration, Construction, Transition.

Artifacts of the process: Artifact Sets Introduction, Management Artifacts, Engineering Artifacts, Pragmatic Artifacts, Requirements Artifacts, Design Artifacts, Implementation Artifacts, Construction Artifacts, Programmatic Artifacts.

Model based Software Architecture: Management Perspective, Technical Perspective.

UNIT - III:

Workflows of the process: Workflows, software process workflows, Iteration Workflows.

Check Points of the process: Major & Minor Milestones, Periodic Status Assessments.

Iterative Process Planning: Work breakdown structure, Planning guidelines, Cost & Schedule Estimating, Iteration Planning Process, Pragmatic planning, Use of software to assist in project planning activities.

UNIT - IV:

Project Organizations and Responsibilities: Line-of-Business Organization, Project Organizations, Evolution of Organizations.

Process Automation: Automation Building Blocks, Project Environment.

Project Control and Process Instrumentation: Seven Core Metrics, Management Indicators, Quality Indicators, Life Cycle Expectations, Pragmatic Software Metrics, Metrics automation.

UNIT - V:

Tailoring the Process: Process Discriminates, Small Scale Project vs. Large Scale Project.

Future Software Project Management: Modern Project Profiles, Next Generation Software Economics, Modern Process Transitions**, CCPDS Case Study.**

TEXTBOOK:

1. Walker Royce, "Software Project Management", Pearson Education, 2009.

REFERENCES:

1. Robert T. Futrell, Donald F. Shafer, and LindaI, "Quality Software Project Management", Shafer, Prentice Hall, January 2002.
2. Stellman, Andrew; Greene, Jennifer, "Applied Software Project Management", O'Reilly Media. ISBN 978-0-596-00948-9, 2005.
3. Alote, Pankaj,"Software project management in practice", Addison-Wesley. ISBN 0-201-73721-3, 2002.
4. MuraliChemuturi, Thomas M. Cagley,"Software Project Management: Best Practices, Tools and Techniques",J.Ross Publishing. ISBN 978-1-60427-034-1, 2010.
5. https://www.slideshare.net/sheetal_singh/software-project-management-by-walker-royce.
6. https://www.youtube.com/watch?v=mh3k9kq2Hfg.

L	T	P	Cr.
3	-	-	3

B.Tech. (VII Sem.) **17CI22 - TCP/IP NETWORKING**

Prerequisite: Fundamentals of Computer Networks and Basic Concepts of Data Communication**.**

Course Educational Objective (CEO): This course enables the students to know about the standards of TCP / IP protocol, addressing types and can learn various protocols like ARP, UDP, ICMP, and IGMP.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Outline the OSI and TCP/IP layers and their functions.
CO2: Understand basic network layer protocols.
CO3: Understand Transport layer issues.
CO4: Familiar with different applications to transfer files in Application Layer.
CO5: Summarize the concepts of next generation addressing formats.

UNIT - I: INTRODUCTION:
The OSI Model and the TCP/IP protocol suite: Protocol Layers, the **OSI** Model, **TCP/IP** Protocol Suite, Addressing. **Underlying Technologies**: Wired LANs, Wireless LANs, Switched WANs and Connecting Devices.
Network Layer (PART-1): Introduction and **IPV4** addresses

UNIT - II: NETWORK LAYER (PART-2):
Delivery and Forwarding of IP Packets, Internet Protocol Version (**IPV4**), Address Resolution Protocol (**ARP**), Internet Control Message Protocol Version4 (**ICMPV4**), Mobile IP, Unicast Routing Protocols (**RIP**, **OSPF**, **BGP**), Multicasting and Multicast Routing Protocols.

UNIT - III: TRANSPORT LAYER:
Introduction to Transport Layer, User Datagram Protocol (**UDP**), Transmission Control Protocol (**TCP**), Stream Control Transmission Protocol (**SCTP**).

UNIT - IV: APPLICATION LAYER:
Introduction to Application Layer, Host Configuration: **DHCP**, Domain Name System (**DNS**), Remote Login: **TELNET** and **SSH**, File Transfer: **FTP** and **TFTP**, World Wide Web (**WWW**) and **HTTP**, Electronic Email: **SMTP**, **POP**, **IMAP** and **MIME**, Network Management: **SNMP**

UNIT - V: NEXT GENERATION:
IPV6 Addressing: Introduction, Address Space Allocation, Global Unicast Address and Auto configuration
IPV6 Protocol: Introduction, Packet Format and Transition from IPV4 to IPV6

TEXTBOOK/S:
1. TCP/IP Protocol Suite, 4/e, Behrouz A Forouzan.
2. Data Communications and Networking, 3/e, Behrouz A Forouzan.
3. The TCP/IP Guide, by Charles M. Kozierok, Free online Resource, http://www.tcpipguide.com/free/index.htm

REFERENCES:
1. Computer Networking: A Top-down Approach by James F. Kurose and Keith W. Ross 5th Ed., Addison-Wesley 2009
2. Michael J. Donahoo and Kenneth L. Calvert , TCP/IP Sockets in Java, 2nd ed., 2011
3. https://www.elsevier.com/books/tcp-ip-sockets-in-java/calvert/978-0-12-374255-1
4. http://www.bau.edu.jo/UserPortal/UserProfile/PostsAttach/10617_1870_1.pdf

B.Tech. (VII Sem.)	17CI23 - ARTIFICIAL INTELLIGENCE	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge of Algorithms.

Course Educational Objective (CEO): This course is used to provide the description of agents and various types of agents and how they used to solve various AI problems. This gives a clear view of analyzing AI problems, types of problems techniques of solving problems. It gives a clear view of knowledge, representation of knowledge, types of logic and its algorithms. It provides a better understanding of uncertainty and certainty, its factors various theories of uncertainty and appropriate examples. It provides a clear view of state space in search, game playing procedures, expert systems and advanced concepts like swarm intelligent systems.

Course Outcomes (COs): After the completion of this course, the student will be able to:

CO1: Understand about AI techniques and different ways to implement them and deals about the techniques and set of rules to find solutions in problem solving.

CO2: Implement and understand about various searching strategies, presenting various searching algorithms in searching techniques and also deals about problem solving techniques in search trees.

CO3: Understand about knowledge, represent different issues in knowledge, and present various ways to represent it, implement predicate and propositional knowledge and present logic resolution and unification techniques.

CO4: Present different types of knowledge and reasoning techniques, understand about logic programming and PROLOG, and implement indexing and matching techniques.

CO5: Present uncertainty in knowledge and various techniques to solve it. Present efficient techniques to remove uncertainty in knowledge domain.

UNIT - I

Introduction: History of AI - Intelligent agents – Structure of agents and its functions –Problem spaces and search - Heuristic Search techniques – Best-first search – Problem reduction - Constraint satisfaction - Means Ends Analysis.

UNIT -II

Knowledge Representation: Approaches and issues in knowledge representation-Knowledge - Based Agent- Propositional Logic – Predicate logic – Unification – Resolution -Weak slot – filler structure – Strong slot - filler structure.

UNIT - III

Reasoning under uncertainty: Logics of non-monotonic reasoning - Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems-Bayesian networks – Dempster - Shafer Theory - Fuzzy Logic.

UNIT - IV

Planning and Learning: Planning with state space search - conditional planning-continuous planning - Multi-Agent planning. Forms of learning - inductive learning – Reinforcement Learning - learning decision trees - Neural Net learning and Genetic learning.

UNIT - V

Advanced Topics: Game Playing: Minimax search procedure - Adding alpha-beta cutoffs. **Expert System:** Representation - Expert System shells - Knowledge Acquisition. **Robotics:** Hardware - Robotic Perception – Planning - Application domains. **Swarm IntelligentSystems** – Ant Colony System, Development, Application and Working of Ant Colony System.

TEXTBOOKS:

1. Elaine Rich, Kevin Knight and ShivashankarB.Nair, “Artificial Intelligence”, TMH, Third edition, 2009. (UNITs I, II, III & V).
2. Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia, Second edition, 2003. (UNIT IV).
3. N. P. Padhy, “Artificial Intelligence and Intelligent System”, Oxford University Press, Second edition, 2005. (UNIT V).

REFERENCES:

1. RajendraAkerkar, “Introduction to Artificial Intelligence”, PHI, 2005.
2. Patrick Henry Winston, “Artificial Intelligence”, Pearson Education Inc., Third edition,2001.
3. Eugene Charniak and Drew Mc Dermott, “Introduction to Artificial Intelligence", Addison Wesley, ISE Reprint, 1998.
4. Nils J.Nilsson, “Artificial Intelligence - A New Synthesis", Harcourt Asia Pvt.Ltd.,Morgan Kaufmann, 1988.
5. www.nptel.ac.in
6. https://www.britannica.com/technology/artificial-intelligence
7. https://www.tutorialspoint.com / Artificial Intelligence / AI – Overview

B.Tech. (VII Sem.)	17CI24 - IMAGE PROCESSING	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge of computer graphics.

Course Educational Objective (CEO): Image processing deals with processing of images which are digital in nature. Study of the subject is motivated by three major applications. The first application is in improvement of pictorial information for human perception i.e. enhancing the quality of the image so that the image will have a better look. The second is for autonomous machine applications which have wider applications in industries, particularly for quality control in assembly automation and many similar applications. This course will introduce various image processing techniques, algorithms and their applications.

Course Outcomes (COs): After the completion of this course, the student will be able to:

CO1: Summarize the fundamentals of digital image processing
CO2: Apply image enhancement techniques in spatial domain
CO3: Apply restoration and color image processing techniques to improve the fidelity of images.
CO4: Analyze image compression, morphological image processing techniques for various applications.
CO5: Evaluate the methodologies for image segmentation

UNIT – I: INTRODUCTION

What is Digital Image Processing, Examples of fieldsthat use digital imageprocessing, fundamental steps in digital imageprocessing, components of image processing system, Digital ImageFundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels.

UNIT – II: IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN

Basic Gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpeningspatial filters.

UNIT – III: IMAGE RESTORATION

A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatialfiltering, Weiner filtering, constrained least squares filtering, geometrictransforms; Introduction to the Fourier transform and the frequencydomain, estimating the degradation function.

Color Image Processing: Color fundamentals, color models.

UNIT – IV:IMAGE COMPRESSION

Fundamentals, image compression models,Lossless Compression:Huffman coding, Run length coding contourcoding, A brief discussion on Lossy Compression Image, compression standards.

MORPHOLOGICAL IMAGE PROCESSING: Preliminaries, dilation, erosion, openand closing, hit ormiss transformation, basic morphologic algorithms.

UNIT – V:IMAGE SEGMENTATION

Detection ofDiscontinuities, edge linking and boundary detection, threshold, region–based segmentation.

TEXTBOOK:

"Digital Image Processing",Rafeal C. Gonzalez, Richard E. Woods, Pearson Education/PHI,2nd edition.

REFERENCES:

1. Milan Sonka, Vaclav Hlavac andRoger Boyle, Image Processing, Analysis, and Machine Vision, Thomson Learning, Second Edition.
2. Alasdair Mc. Andrew, Introduction to Digital Image Processing with Matlab, Thomson Course Technology.
3. Computer Vision and Image Processing, Adrian Low, B.S. Publications,2nd edition.
4. RafealC. Gonzalez, Richard E.Woods, Steven L. Eddins, Digital Image Processing using Matlab, Pearson Education.
5. http://freevideolectures.com/Course/2316/Digital-Image-Processing-IIT-Kharagpur/1
6. http://nptel.ac.in/courses/117105079/
7. http://nptel.ac.in/courses/117105135/
8. https://www.youtube.com/watch?v=CVV0TvNK6pk

B.Tech. (VII Sem.)	17CS10 - SERVICE ORIENTED ARCHITECTURE	L	T	P	Cr.
		3	-	-	3

Prerequisite: Fundamentals of Web Technologies

Course Educational Objective (CEO): This course enables the student to understand fundamentals of primitive and contemporary SOA and various service layers. The Students knows about how SOA we services are used for designing flexible and loosely integrated services in distributed environments.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Understand basic principles of service oriented architectures.
CO2: Analyze web services framework, orchestration and Choreography of SOA for different applications.
CO3: Develop SOA messages from business use cases.
CO4: Identify various WS specification standards at different service layers.
CO5: Design SOA using different WS specification standards on SOA platforms.

UNIT –I : INTRODUCTION:
Introducing SOA: Fundamental SOA, Common Characteristics of Contemporary SOA, Common Tangible Benefits of SOA, principles of service orientation**.**
The Evolution of SOA: An SOA Timeline (from XML to Web services to SOA), The Continuing Evolution of SOA (Standards organizations and Contributing vendors), The Roots of SOA (comparing SOA to Past architectures).

UNIT -II : WEB SERVICE AND SOA:
Web Services and Primitive SOA: Web Services Framework, Services, Service Descriptions, Messaging.
Web Services and Contemporary SOA (Part-I): Message Exchange Patterns, Service Activity, Coordination, Atomic Transactions, Business Activities, Orchestration and Choreography.

UNIT –III : WEB SERVICES AND CONTEMPORARY SOA:
Web Services and Contemporary SOA (Part-II): Addressing, Reliable Messaging, Correlation, Policies, Metadata Exchange, Security, Notification and Eventing.

UNIT - IV :**PRINCIPLES AND SERVICE LAYERS:**
Principles of Service-Orientation: Service-Orientation and the Enterprise, Anatomy of Service-Oriented Architecture, Common Principles of Service-Orientation, How Service-Orientation Principles Inter-relate, Service-Orientation and Object-Orientation.
Service Layers: Service-Orientation and Contemporary SOA, Service Layer Abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services.

UNIT - V:**SERVICE-ORIENTATED ANALYSIS:**
Service-Orientated Analysis: Introduction to Service-Oriented Analysis, Benefits of a Business-Centric SOA, Deriving Business Services, Service Modeling Guidelines.
Service-Orientated Design: Introduction to Service-Orientated Design, WSDL-related XML Schema Language Basics, WSDL Language Basics, SOAP Language Basics, and Service Interface Design Tools.
SOA Platforms: SOA platform basics; SOA support in J2EE.

TEXTBOOK/S:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2009.
2. Thomas Erl, "SOA Principles of Service Design" (The Prentice Hall Service- Oriented Computing Series from Thomas Erl), 2005.

REFERENCES:

1. Michael Rosen, Boris Lublinsky, "Applied SOA Service Oriented Architecture and Design Strategies", Wiely India Edition, 2008.
2. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
4. MuninderSingh , Michael Huhns, "Service Oriented Computing", Wiley Publication.
5. Mark D Hansen,"SOA using Java Web Services", Prentice Hall Publication.
6. http://freevideolectures.com/Course/3616/Java/J2EE-and-SOA/45
7. SOA Tutorial For Beginners: https://www.youtube.com/watch?v=wtcJzVJtX3U

L	T	P	Cr.
3	-	-	3

B.Tech. (VII Sem.) **17CI31 - AD-HOC NETWORKS**

Prerequisite: Computer Networks and Basics of Data Communications.

Course Educational Objective (CEO): The student can able to learn the technical issues and state-of-the-art techniques in the operation and management of mobile communications networks and can understand the issues involved in mobile communication system design and analysis.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Understand the state-of-the-art in network protocols, architectures and applications.
CO2: Analyze routing protocols in Ad-hoc network.
CO3: Design hybrid protocols in Ad-hoc networks.
CO4: Interprets how energy management is done in Ad-hoc networks.
CO5: Understand Wireless Sensor networks and its advancements.

UNIT – I:
Ad Hoc Wireless Networks: Introduction, Issues in Ad Hoc Wireless networks
Medium Access Control: Issues in MAC, Design Goals of MAC, Classification of MAC protocols.
Contention Based MAC Protocols: MACAW, Floor Acquisition Multiple Access Protocol, Busy Tone Multiple Access protocols.
Reservation Mechanisms: D-PRMA, CATA. Scheduling Mechanisms: DPS

UNIT – II:
Routing in Ad hoc Wireless networks: Issues in Routing, Classification of Routing Protocols.
Table Driven: DSDV, WRP, STAR. On Demand: AODV, DSR, LAR
Hybrid Routing: ZRP, CEDAR
Hierarchical Routing: HSR, FSR.

UNIT – III:
Hybrid Wireless Networks: Introduction
Next Generation Hybrid Network Architectures: MCN, HWN, iCAR, SOPRANO, TWILL, A-GSM, UCAN, Open Issues in Next Generation Hybrid Architectures, Pricing in Hybrid Wireless Networks.

UNIT - IV:
Energy Management in Ad-hoc Wireless Networks: Introduction, Need For Energy Management, Classification of Energy Management Schemes, Battery Management Schemes, Transmission Power Battery Management Schemes.

UNIT - V:
Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, Mac Protocols for Sensor Networks, Location Discovery
Recent Advances in Wireless Networks: Wireless Fidelity Systems, Optical Wireless Networks, Multimode 802.11

TEXT BOOKS:
1. C. Siva Ram Murthy, B.S. Manoj, " **Ad Hoc Wireless Networks: Architectures and Protocols",** Pearson Education, 2004.
2. Holger Karl and Andreas Willig, "**Protocols and Architectures for Wireless Sensor Networks"**, WILEY lecturesand applications (ISBN: 0-470-09510-5).

REFERENCES:

1. Stefano Basagni, Marco Conti, Silvia Giordano, Ivan Stojmenović, "**Mobile ad hoc networking",** IEEE Press, Wiley InterScience, 2004
2. Feng Zhao and Leonidas J. Guibas**, "Wireless Sensor Networks: An Information Processing Approach"** (Morgan Kaufmann, 2004).
3. Rappaport**, "Wireless Communications: Principles and Practice"**Second Edition, Pearson Education,2009
4. https://www.youtube.com/watch?v=Jmfd4KPGPp0
5. http://nptel.ac.in/courses/106105160/

B.Tech. (VII Sem.) 17CI25 - NEURAL NETWORKS AND FUZZY LOGIC	L	T	P	Cr.
	3	-	-	3

Prerequisite: Basics of Linear Algebra and DMS.

Course Educational Objective (CEO): Upon successful completion of this subject students should be able to develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory. Explore the functional components of neural network classifiers or controllers, and the functional components of fuzzy logic classifiers or controllers. Develop and implement a basic trainable neural network or a fuzzy logic system for atypical control, computing application or biomedical application.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Identify constraints, uncertainties and risk of the system
CO2: Apply systems thinking to understand complex system behaviour including interactions between components and with other systems
CO3: Identify and apply relevant problem solving methodologies
CO4: Engineering and IT practice involves the coordination of a range of disciplinary and
CO5: Interdisciplinary activities to arrive at problem and design solutions.

UNIT - I:
Introduction to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.
Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN-Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules

UNIT - II:
Single Layer Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category Training Algorithms, Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications
Multilayer Feed Forward Neural Networks: Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT - III:
Associative Memories: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem.Architecture of Hopfield Network: Discrete and Continuous versions, Storage and RecallAlgorithm, Stability Analysis.

UNIT – IV:
Classical Sets & Fuzzy Sets: Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, Properties, fuzzy relations, cardinalities, membership functions.

UNIT – V:

Fuzzy Logic System Components: Introduction, Fuzifications, Membership Value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

TEXTBOOKS:

1. S.N.Sivanandam, S.Sumthai, S.N.Deepa, "Introduction to Neural Networks using MATLAB 6.0", Tata McGraw Hill Publications, India, 2005.
2. S.N.Sivanandam, S.Sumthai, S.N.Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer Verlag Publishers Ltd, Germany,2007.

REFERENCES:

1. S.N.Sivanandam, S.N.Deepa, "Principles of Soft Computing", Wiley India Ltd, India, 2007.
2. Simon Haykin," Neural Networks - A comprehensive foundation ", Pearson Education, 2001.
3. James A Freeman and DavisSkapura, Neural Networks, Pearson Education, 2002.
4. www.nptel.ac.in
5. https://www.tutorialspoint.com/fuzzy_logic/fuzziness_in_neural_networks.htm

B.Tech. (VII Sem.)	17CI26 - PATTERN RECOGNITION	L	T	P	Cr.
		3	-	-	3

Prerequisite: Basic knowledge of probability &statistics, data mining.

Course Educational Objective (CEO): The main objective of this course is that the concept of a pattern and the basic fundamentals of pattern recognition and its relevance to classical and modern problems and to be able to identify where, when and how pattern recognition can be applied.

Course Outcomes (COs): After the completion of this course, the student will be able to:

CO1: Analyse classification problems probabilistically and estimate classifier performance
CO2: Understand the concepts of Bayesian decision theory
CO3: Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models.
CO4: Apply unsupervised learning algorithms to data objects & Analyze clustering algorithms.
CO5: Apply Hidden Markov models in real-time applications.

UNIT - I:

Introduction: Machine perception, pattern recognition example, pattern recognition systems, the Design cycle, learning and adaptation

Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification-zero–one loss function, classifiers, discriminant functions, and decision surface

UNIT – II:

Normal density: Univariate and multivariate density, discriminant functions for the normal Density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context

UNIT – III:

Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood Estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case.

UNIT - IV:

Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering

UNIT - V:

Pattern recognition using discrete hidden Markov models: Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs

Continuous Hidden Markov models: Continuous observation densities, multiple mixtures per state, speech recognition applications.

TEXTBOOKS:

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Pattern Recognition, an Introduction, V Subshell Devi, M Narsimha Murthy, Universiy Press.

REFERENCES:

1. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley, 1992.
2. Pattern Recognition and Image Analysis – Earl Gose, Richard John baugh, Steve Jost PHI 2004
3. Fundamentals of speech Recognition, LawerenceRabiner, Biing – Hwang Juang Pearson education.
4. Pattern Recognition, SergiosTheodoridis, Konstantinos Koutroumbas, Academic Press, Elsevier, 4ed.
5. http://freevideolectures.com/Course/3194/Pattern-Recognition
6. http://nptel.ac.in/courses/117105101/
7. http://freevideolectures.com/Course/3530/Pattern-Recognition-I

B.Tech. (VII Sem.)	17CI68 - BIG DATA WITH HADOOP LAB	L	T	P	Cr.
		-	-	2	1

Prerequisite: Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment

Course Educational Objectives (CEO): This course provides practical, foundation level training that enables immediate and effective participation in Big Data and other Analytics projects using Hadoop and R

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Preparing for data summarization, query, and analysis.
CO2: Applying data modelling techniques to large data sets
CO3: Creating applications for Big Data analytics

Week-1:
Downloading and installing Hadoop; Understanding different Hadoop modes. Startup scripts, Configuration files.
Week-2:
Hadoop Implementation of file management tasks, such as Adding files and directories, Retrieving files and Deleting files
Week-3:
Implementation of Matrix Multiplication with Hadoop Map Reduce
Week-4
Implementation of Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
Week-5:
Implementation of K-means clustering using map reduce
Week-6:
Installation of Hive along with practice examples.
Week-7:
Installation of HBase, Installing thrift along with Practice examples
Week-8:
Installation of R, along with Practice examples in R.

TEXTBOOKS:
2. Tom White “Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
3. Seema Acharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015

REFERENCES:
2. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
3. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013).
4. AnandRajaraman and Jefrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press,2012.
5. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012, 2001.
6. http://nptel.ac.in/courses/106104135/48
7. http://nptel.ac.in/courses/110106064/

L	T	P	Cr.
-	-	2	1

B.Tech. (VII Sem.) **17CI69 - INTERNET OF THINGS LAB**

Prerequisite: Python programming

Course Educational Objective (CEO): The objective of this course, to give a comprehensive view of the "Internet of Things" (Applications/ Potentials/ Challenges).To analyze enabling technologies to make it happen (Embedded Devices and communication protocols) and to conduct Hands on activities (Guidelines on how to operate "things" in the "Internet of Things").

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Understand the application areas of IOT.
CO2: Understand building blocks of Internet of Things and characteristics.
CO3: Understand enabling technologies Embedded Devices and communication protocols for Hands on activities. Write programs using Python for processing Internet of Things.

CYCLE - 1:
Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.

CYCLE - 2:
1. Run some python programs on Pi like:
2. Read your name and print Hello message with name
3. Read two numbers and print their sum, difference, product and division.
4. Word and character count of a given string
5. Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input
6. Print a name 'n' times, where name and n are read from standard input, using for and while loops.
7. Handle Divided by Zero Exception.
8. Print current time for 10 times with an interval of 10 seconds.
9. Read a file line by line and print the word count of each line.

CYCLE - 3:
1. Light an LED through Python program
2. Get input from two switches and switch on corresponding LEDs
3. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

CYCLE - 4:
1. Flash an LED based on cron output (acts as an alarm)
2. Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.

CYCLE - 5:
1. Access an image through a Pi web cam.
2. Control a light source using web page.

CYCLE - 6:
1. Implement an intruder system that sends an alert to the given email.
2. Get the status of a bulb at a remote place (on the LAN) through web.

CYCLE - 7:

1. Get an alarm from a remote area (through LAN) if smoke is detected.
2. Display the room temperature on the display devices using sensors.

CYCLE - 8:

The student should have hands on experience in using various sensors like humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

REFERENCES:

1. wwwusers.di.uniroma1.it/~spenza/files/labIoT2015/Lab-IoT-1.pdf.
2. www.mobileeducationkit.net/labmanuals/LAB-Manual-mbed.docx.

B.Tech. (VII Sem.)	17CS92 - INFORMATION RETRIEVAL SYSTEMS (Add on course – III)	L	T	P	Cr.
		3	-	-	3

Prerequisite: Fundamentals of database concepts, data structures & data warehouse.

Course Educational Objective (CEO) : The main objective of this course is to present the basic concepts in information retrieval and the significance of various indexing and searching techniques for information retrieval.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Identify the basic concepts of Information retrieval system.
CO2: Evaluate the taxonomy of different information retrieval models.
CO3: Demonstrate and evaluate automatic indexing, document & term clustering techniques.
CO4: Demonstrate and evaluate various searching techniques.
CO5: Evaluate text processing techniques and operations in information retrieval system

UNIT - I:
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.
Information Retrieval System Capabilities: Search, Browse, and Miscellaneous Capabilities.

UNIT - II:
Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.
Cataloguing and Indexing: Objectives, Indexing Process, Automatic Indexing, and Information Extraction.

UNIT - III:
Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT - IV:
User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext.
Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

UNIT - V:
Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.
Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

TEXTBOOK:

Kowalski, Gerald, Mark T Maybury, "Information Storage & Retrieval Systems: Theory and Implementation", Kluwer Academic Press, 2nd edition, 2002.

REFERENCES:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. https://epdf.tips/queue/information-storage-and-retrieval-systems-theory-and-implementation-the-informat.html Robert Korthagen, John Wiley & Sons, "Information Storage & Retrieval".

B.Tech. (VIII Sem.)	17CI27 - SOFTWARE REQUIREMENTS ENGINEERING	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge of Software Engineering, testing methods, Project Management.

Course Educational Objective (CEO): The main objective of this course is to know the elicitation, analysis, modelling and specification of software engineering requirements. Student will learn, in depth, the various selected models, tools, notations and validation techniques for the analysis and specification of system requirements that will enable him to apply these in subsequent projects and work experiences. It also about the need for requirements in large-scale systems and stakeholders involved in requirements engineering.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Understand the basics of requirements engineering and process maturity.
CO2: Apply the requirement elicitation methods to specify documentation.
CO3: Validate the requirements through various test approaches and management requirements.
CO4: Estimate the software size with various techniques.
CO5: Apply requirement management tools and software estimation tools for cost estimation and productivity.

UNIT I: INTRODUCTION TO REQUIREMENTS ENGINEERING:
Software Requirements Definition – Levels of Requirements – Requirement Engineering - Requirements Development and Management – When Bad Requirements happen to Nice People - Benefits from a High quality requirements process – Characteristics of Excellent Requirements– Functional and Non-functional Requirements –Good Practices for Requirements Engineering - Practical process Improvement - Process Maturity – Requirement Engineering process maturity.

UNIT II: REQUIREMENTS ELICITATION, ANALYSIS AND DOCUMENTATION:
Requirements Elicitation Guidelines – Requirements Elicitation Techniques – Requirement Analysis – Requirement Analysis Models – Requirement Analysis and Negotiation – Requirements Documentation – Characteristics of Software Requirements Specification Document – Contents of SRS – Common Problems with SRS

UNIT III: REQUIREMENTS VALIDATION AND MANAGEMENT:
Validation objectives –Review the Requirements – The Inspection Process – Requirements Review Challenges – Testing the Requirements – Defining Acceptance Criteria – Requirement Validation Guidelines.
Requirements Management – Requirement Traceability – Database to Manage Requirements – Change Management Policies – Requirements Engineering for Critical Systems - Software Requirements and Risk Management.

UNIT IV: SOFTWARE SIZE ESTIMATION:
Software Estimation –Size Estimation – Two views of Sizing – Function Point Analysis – Mark II FPA – Full Function Points - LOC Estimation – Conversion between Size Measures

UNIT V: EFFORT – SCHEDULE, COST ESTIMATION & TOOLS:

Productivity–Estimation Factors – Approaches for Effort and Schedule Estimation – COCOMOII – Putnam Estimation Model – Algorithmic Models – Cost Estimation

Tools: Desirable Features of Requirements Management Tools – Some Requirements Management Tools Available – Rational pro - Desirable Features in Software Estimation Tools – Some Software Estimation Tools Available

TEXTBOOKS:

1. Software Requirements, Karl E. Wiegers, Word Power Publishers, 2000.
2. Software Requirements and Estimation, Rajesh Naik , Swapna Kishore, TMH

REFERENCES:

1. Requirements Engineering: A Good practice Guide, Ian Sommerville, Pete Sawyer, Pearson, 2004**.**
2. Managing Software Requirements A Use Case Approach, 2/e, Dean, Don ,Addision-Wesley, 2003**.**
3. Requirements Engineering and Rapid Development, Ian Graham, Addision-Wesley, 1998.
4. Mastering the Requirements Process. 2/e, S.Robertson, J.Robertson, Pearson, 2006.
5. https://www.youtube.com/watch?v=h7l6K181afo
6. https://www.vutube.edu.pk/vu-lectures/.../software-requirement-engineering-cs708
7. freevideolectures.com › Computer Science › IIT Bombay
8. https: //nptel.ac.in/courses/106101061/5

B.Tech. (VIII Sem.)	17CS11 - STORAGE AREA NETWORKS	L	T	P	Cr.
		3	-	-	3

Prerequisite: Information Retrieval System, Computer Networks

Course Educational Objective (CEO): To understand Storage Area Networks characteristics and components. Storage Area Networks including storage architectures, logical and physical components of a storage infrastructure, managing and monitoring the data centre. Storage Area Networks describe the concept of RAID and different RAID levels and their suitability for different application environments.SAN understand the different networked storage options for different application environments.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: To understand core elements of a data centre infrastructure
CO2: Identify different types of RAID implementations and their benefits.
CO3: To analyze the benefits of the different network storage options for different application environments.
CO4: To identify single points of failure in a storage infrastructure and list solutions to mitigate these failures
CO5: To identify key management tasks in a data centre.

UNIT - I:
Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a date centre infrastructure, role of each element in supporting business activation Hardware and software components of the host environment, Key protocol and concepts used by each component, Physical and logical component of a connectivity environment.

UNIT – II:
Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics and performance Implications ,Concept of RAID and its components, Different RAID levels and the suitability for different application environments: RAID 0, RAID 1, RAID : RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contra Hi integrated and modular storage systems ,High—Level architecture and working of an intelligent storage system Evolution of networked storage, Architecture, components, and topology of FC-SAN, NAS, and IP-SAN.

UNIT - III:
Benefits of the different networked storage options, understand the need for long-term archiving solutions and how CAS fulfils the need, understand the appropriateness of the difficult networked storage options for different application environments List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) .

UNIT- IV:

RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/recovery topologies replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities

UNIT – V:

Identify key areas to monitor in a data centre, Industry standards for data centre monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data centre.

TEXTBOOK:

EMC Corporation, Information Storage and Management, Wiley.

REFERENCES:

1. Robert Spalding, "Storage Networks: The Complete Reference", Tata
2. McGraw Hill, Osborne, 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw HiIl, Osborne, 2001.
4. Meeta Gupta, "Storage Area Network Fundamentals", Pearson Education Limited, 2002.
5. http://nptel.ac.in/downloads/106108058/
6. http://www.redbooks.ibm.com/redbooks/pdfs/sg245470.pdf
7. https://www.youtube.com/watch?v=teEsgqI49Dk

L	T	P	Cr.
3	-	-	3

B.Tech. (VIII Sem.) **17CI28 - MACHINE LEARNING**

Prerequisite:Knowledge on Probability, Statistics and Linear Algebra.

Course Educational Objective (CEO): To provide students with an in-depth introduction to two main areas of Machine Learning: supervised and unsupervised. We will cover some of the main models and algo`rithms for regression, classification, clustering. Topics will include linear and logistic regression, regularisation, MLE, probabilistic (Bayesian) inference, ANNs, clustering, and dimensionality reduction. At the end of the course the students should be able to design and implement machine learning solutions to classification, regression, and clustering problems and be able to evaluate and interpret the results of the algorithms.

Course Outcomes: After the completion of this course, the student will be able to:
CO1: Understand basic elements of Decision Trees, Random forests, Application of Bayes Rule.
CO2: Able to solve real world problems using Linear & Logistic Regression techniques.
CO3: Understand the hidden patterns inside the data using clustering techniques.
CO4: Able to formulate problem in terms of Graphical Models and apply the probabilistic principles.
CO5: Understand the Neural Networks & Deep Networks to solve real world problem.

UNIT - I:
Introduction: Introduction to ML, ML Examples, Well defined machine learning problem, Decision tree learning and Random Forests.
Probabilistic Classification: Bayes rule, MLE, MAP, Conditional Independence, Naive Bayes and Gaussian Bayes classifiers.

UNIT - II: REGRESSION:
Linear Regression:Basic model, solving linear regression, Error in linear regression, Advanced regression models.
Logistic Regression: Logistic regression vs. linear regression, sigmoid function, MLE via gradient ascent, Regularization, Logistic regression for multiple classes

UNIT - III: CLUSTERING:
k-means, Lloyd's method, Hierarchical clustering, Agglomerative Clustering, Mixture of Gaussian clustering, Dimensionality Reduction.

UNIT - IV: GRAPHICAL MODELS:
Bayes Nets, Representing joint distributions with conditional independence assumptions, Inference, Learning from fully observed data, Learning from partially observed data, EM algorithm.

UNIT – V: NEURAL NETWORKS:
Perceptron, Multi-layer Neural Networks, Deep Neural Networks.

TEXTBOOK:
Bishop C, Pattern Recognition and Machine Learning, 2007.
REFERENCES:
1. Rogers S and Girolami M, A first course in Machine Learning, CRC Press, 2011.
2. Mitchell T, Machine Learning, McGraw-Hill, 1997.
3. Barber D, Bayesian Reasoning and Machine Learning, 2012.
4. https://onlinecourses.nptel.ac.in/noc18_cs26/preview

L	T	P	Cr.
3	-	-	3

B.Tech. (VIII Sem.) **17CS12 - COLOR IMAGE PROCESSING**

Prerequisite: Knowledge on basics of Digital Image Processing.

Course Educational Objective (CEO): On completion of this course, a student will be familiar with Color Image Processing Concepts which helps them to solve Computer Vision Problems & Robotics problems. At the end of the course, the students should be able to understand different methods to process Color image for solving real world problems.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Understand basic elements of Color Image, Color models.
CO2: Able to apply the filtering techniques for enhancing the Color image.
CO3: Understand the Algorithms for Color Image segmentation for Higher Level Analysis.
CO4: Understand the concepts of Image Resizing and Feature Detection Methods.
CO5: Understand the concepts of Semantic Processing, Real time Applications.

UNIT— I: INTRODUCTION:
Color Fundamentals. Color Models, Pseudo Color Image Processing., processing basics of full Color image processing

UNIT—II: COLOR IMAGE ENHANCEMENT:
Introduction, Vector Median Based Filters, Fuzzy Adaptive Filters, Switching Filters, Application of Anisotropic Diffusion to Color Images.

UNIT— III: COLOR IMAGE SEGMENTATION:
Introduction, Clustering in the Color Space, Region Growing for Color Images: Seeded Region Growing, Unseeded Region Growing, Post processing, Shadows and Highlights.

UNIT- IV: COLOR IMAGE RESIZING & FEATURE DETECTION:
Resizing: Introduction, Image Resizing Techniques, Image Halving and Image Doubling Algorithms
Feature Detection: Color Invariance, Combining Derivatives, Fusion of Color Derivatives, Boosting Color Saliency.

UNIT – V: SEMANTIC PROCESSING:
Knowledge-Assisted Analysis, MPEG-7 and Semantic Web Technologies.
Case Studies: Facial Image Analysis, Eye Tracking & Automatic Video Surveillance Systems.

TEXTBOOK/S:
1. Digital Image Processing, RafealC.Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.
2. RastislavLukac, Kostantinos N . Plataniotis, "Color Image Processing: Methods and Applications" , CRC Press, ISBN 978-0849397745

REFERENCES:
1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology.
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications.
4. http://nptel.ac.in/courses/117105079/2

B.Tech. (VIII Sem.) 17CS13 - SOFTWARE SECURITY ENGINEERING	L	T	P	Cr.
	3	-	-	3

Prerequisite: Fundamentals of Software Engineering

Course Educational Objective (CEO): Students will demonstrate knowledge of the distinction between critical and non-critical systems and will author a software testing plan and metrics for secure software engineering

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Evaluate secure software engineering problems, including the specification, design, implementation, and testing of software systems.
CO2: Elicit, analyze and specify security requirements through SRS.
CO3: Design and Plan software solutions to security problems using various paradigms.
CO4: Model the secure software systems using Unified Modeling Language Sec.
CO5: Develop and apply testing strategies for Secure software applications.

UNIT - I:
Why Is Security a Software Issue?: Introduction, The problem, Software assurance and software security, Threats to software security, Sources of software insecurity, The benefits of detecting software security defects early, Managing secure software development.
What Makes Software Secure?: Defining properties of secure software, How to influence the security properties of software, How to assert and specify desired security properties.

UNIT - II:
Requirements Engineering for Secure Software: Introduction, Misuse and Abuse Cases, The SQUARE process model: SQUARE sample outputs, Requirements elicitation, Requirements Prioritization
Secure Software Architecture and Design: Introduction, Software security practices for architecture and design: Architectural risk analysis. Software security knowledge for architecture and design: Security principles, Security guidelines, and Attack patterns.

UNIT - III:
Considerations for Secure Coding and Testing: Introduction, Code analysis, Coding practices, Software security testing, Security testing considerations throughout the SDLC.
Security and Complexity: System Assembly Challenges: Introduction, Security failures, Functional and attacker perspectives for security analysis, System complexity drivers and security, Deep technical problem complexity.

UNIT - IV:
Governance and Managing for More Secure Software: Introduction, Governance and security, Adopting an enterprise software security framework, How much security is enough?, Security and project management, maturity of practice.

UNIT - V:
Security Metrics: Defining security metrics, Diagnosing problems and measuring technical security, Analysis techniques, Organize, aggregate, and analyze data to bring out key insights.

TEXTBOOKS:

1. Software Security Engineering: A Guide for Project Managers, by Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, Addison-Wesley , 1st edition, 2008.
2. Security Metrics: Replacing Fear, Uncertainty, and Doubt , by Andrew Jaquith, Addison Wesley , 1st edition , 2007

REFERENCES:

1. Integrating Security and Software Engineering: Advances and Future Vision, by HaralambosMouratidis, Paolo Giorgini, IGI Global, 2006.
2. Software Security: Building Security In , by Gary McGraw , Addison-Wesley, 2006
3. The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities, by Mark Dowd, John McDonald, Justin Schuh, Addison-Wesley, 1st edition, 2006
4. Building Secure Software: How to Avoid Security Problems the Right Way by John Viega, Gary McGraw, Addison-Wesley, 2001.

B.Tech. (VIII Sem.)	17CI29 - CLOUD COMPUTING	L	T	P	Cr.
		3	-	-	3

Prerequisite: Knowledge in basics of Operating System & Computer Networks.

Course Educational Objective (CEO): This course provides the knowledge on understanding modern technologies, tools and systems in the field of cloud computing, analyze complex engineering problems and relevance to the society and industry. And finally they can have good skills in cloud application development and maintenance.

Course Outcomes (COs): After the completion of this course, the student will be able to:
CO1: Analyze various delivery and deployment models.
CO2: Analyze the virtual machine provisioning and virtualized storage Strategies.
CO3: Explore the PAAS Services.
CO4: Explore the SAAS Services.
CO5: Identify the issues in monitoring and management in cloud environment and also identifying the components for deployment of applications on the cloud.

UNIT – I: FOUNDATIONS:
Introduction to Cloud Computing, Migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era, Cloud Computing for Enterprise Applications

UNIT – II: INFRASTRUCTURE AS A SERVICE (IAAS):
Virtual Machines Provisioning and Migration Services, On the Management of Virtual Machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a Cluster as a Service, Secure Distributed Data Storage in Cloud Computing

UNIT – III: PLATFORM AS A SERVICE (PAAS):
Aneka – Integration of Private and Public Clouds, CometCloud: An Autonomic Cloud Engine, T-Systems' Cloud-Based Solutions for Business Applications.

UNIT – IV: SOFTWARE AS A SERVICE (SAAS):
Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments, the MapReduce Programming Model and Implementations

UNIT – V: MONITORING AND MANAGEMENT:
An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing: A Service Provider's Perspective, Performance Prediction for HPC on Clouds, Architecting Applications for the Amazon Cloud.

TEXTBOOK:
"**Cloud Computing: Principles and Paradigms**", RajkumarBuyya, James Broberg, Andrzej Goscinski**,** Wiley, New York, USA

REFERENCES:
1. "Mastering Cloud **Computing"** RajkumarBuyya**,** Christian Vecchiola ,S ThamaraiSelvi.
2. Building the Infrastructure for Cloud Security,byRaghuramYeluri, Published March 2014
3. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl Published May 2013
4. https://onlinecourses.nptel.ac.in/noc18_cs16/preview
5. https://www.w3schools.in/cloud-computing/cloud-computing/
6. http://freevideolectures.com/blog/2015/04/guide-to-learn-cloud-computing/

B.Tech. (VIII Sem.) **17CI30 - NATURAL LANGUAGE PROCESSING**

L	T	P	Cr.
3	-	-	3

Prerequisite: Fundamental concepts automata theory and Artificial intelligence.

Course Educational Objective (CEO): This course is intended to provide the students by applying various methodologies of computer science and linguistics to the processing of natural languages.

Course Outcomes (COs): By the completion of the course, the students should be able to:

CO1: Outline the concept of natural language processing and grammar and challenges of NLP and various concepts of Modelling.
CO2: Analyse the word level analysis and syntactic and semantic analysis of NLP.
CO3: Create the architecture of NLP and process the structure and generation of NLP.
CO4: Understand various machine translation mechanisms.
CO5: Examine the details of information retrieval systems.

UNIT – I:

Introduction:-What is Natural Language Processing (NLP), Origins of NLP, Language and Knowledge, The Challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications, Some Successful Early NLP systems.

Language Modelling: -Introduction, Various Grammar-based Language Models, Statistical Language Model.

UNIT – II:

Word level analysis:-Regular Expressions, Finite-State Automata, Morphological Parsing, Spelling Error Detection and Correction, Words and Word Classes, Part-of-Speech Tagging.

Syntactic and semantic analysis Introduction, Context-Free Grammar, Constituency, Parsing, Probabilistic Parsing, Indian Languages. Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation**.**

UNIT – III:

Discourse Processing and Natural Language Generation:-Introduction, Cohesion, Reference Resolution, Discourse Coherence and Structure, Architectures of NLP Systems, Generation Tasks and Representations, Applications of NLP.

UNIT – IV:

Machine Translation:-Introduction, Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Direct Machine Translation, Rule-based Machine Translation, Semantic or Knowledge-based MT systems, Corpus-based Machine Translation, Translation involving Indian Languages.

UNIT – V:

Information retrieval and lexical resources:-Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net- Stemmers-POS Tagger-Research Corpora.

TEXTBOOK:

Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", 2008 Oxford University Press.

REFERENCES:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2nd Edition, 2008 Prentice Hall.
2. James Allen, "Natural Language Understanding", 2nd edition, 1995 Benjamin /Cummings publishing company.
3. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_natural_language_processing.htm
4. https://www.cse.iitb.ac.in/~cs626-460-2012/
5. https://www.youtube.com/watch?v=02QWRAhGc7g

B.Tech. (VIII Sem.)	17CS14 - VIRTUAL REALITY	L	T	P	Cr.
		3	-	-	3

Pre requisite: Fundamentals of basic mathematics, data structures and java, computer graphics.

Course Educational Objective (CEO): This course enables the students to learn the fundamental aspects, principles of virtual reality technology and its applications.

Course Outcomes (COs):

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

CO1: Outline the components of the virtual reality system.
CO2: Identify various input and output devices used for virtual reality.
CO3: Apply different modelling concepts for visual virtualization.
CO4: Analyse the performance of various virtual reality applications.
CO5: Implement 3D technology with virtual programming concepts.

UNIT – I:

Introduction: - The three I"s of virtual reality, commercial VR technology and the five classic Components of a VR system.

UNIT – II:

Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.
Output Devices: Graphics displays, sound displays & haptic feedback.

UNIT – III:

Modelling: Geometric modelling, kinematics modelling, physical modelling, and behaviour modelling, model management.

UNIT – IV:

Human Factors: Methodology and terminology, user performance studies, VR health and safety issues.
Applications: Medical applications, military applications, robotics applications.

UNIT - V:

VR Programming-I: -Introducing Java 3D, loading and manipulating external models, using a lathe to make shapes.
VR Programming-II: - 3D Sprites, animated 3D sprites, particle systems. Interacting with Virtual Agents in Shared Space: Single and Joint Effects of Gaze and Proxemics.

TEXTBOOKS:

1. Virtual Reality Technology, Second Edition, Gregory C. Burdea& Philippe Coiffet, John Wiley & Sons, Inc.
2. Killer Game Programming in Java, Andrew Davison, 2005 Oreilly-SPD.

REFERENCES:

1. Understanding Virtual Reality, interface, Application and Design, William R.Sherman, Alan Craig, Elsevier (Morgan Kaufmann).
2. 3D Modelling and surfacing, Bill Fleming, Elsevier (Morgan Kauffman).
3. 3D Game Engine Design, David H.Eberly, Elsevier.
4. Virtual Reality Systems, John Vince, Pearson Education.
5. http://vr.isdale.com/WhatIsVR/frames/WhatIsVR4.1.html.
6. http://www.mic.atr.co.jp/~poup/research/ar/
7. http://www.cs.tut.fi/kurssit/SGN-5406/lectures/VR1-introduction.pdf

L	T	P	Cr.
-	-	24	12

B.Tech. (VIII Sem.) **17PD11 – PROJECT WORK**

PRE-REQUISITES: Knowledge Gained In All the Theory and Practical Courses, As Well As the Knowledge Gained In Internship and Mini Project

COURSE EDUCATIONAL OBJECTIVES: the main objective of this course is to make the student plan and execute a project as team using the available resources within and outside the institute.

COURSE OUTCOMES: After the completion of this course, the student will be able to:

CO1: Identify, Formulate a problem. Define the scope of the problem and outline a solution for the problem
CO2: Design and implement a viable solution to the problem
CO3: Learn and use modern tools to solve problems efficiently
CO4: Develops the ability of team work and leadership skills.
CO5: Report the outcomes of the project by means of verbal and written presentation

L	T	P	Cr.
-	-	2	1

B.Tech. (VIII Sem.) **17PD12 – COMPREHENSIVE VIVA-VOCE**

Pre-requisites: Specific subjects the student has undertaken during his/her studies for the B.Tech degree.

COURSE EDUCATIONAL OBJECTIVE: The comprehensive viva-voce will test the student's competency inSix basic areas of Computer Science and Engineering.

COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1: Develop a holistic view of how various sub-areas fit into the broad Computer Science and Engineering field.

CO2: Develop communication and self-learning skills.