NETAJI SUBHAS UNIVERSITY

EVALUATION SCHEME & SYLLABUS FOR

BACHELOR OF TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING
(B. TECH- CSE)

On

Choice Based Credit System

(Effective from the Session: 2023-24)

Netaji Subhas University
Pokhari, Near Bhilai Pahadi, Jamshedpur, Jharkhand

VISION

To strive for excellence in education, research, and entrepreneurship, with the ultimate goal of becoming a global hub for innovation. Committed to advancing scientific and technological services, we aim to contribute meaningfully to society.

MISSION

- To provide high-quality education that nurtures innovation, entrepreneurship, and ethical values, shaping future professionals equipped for a globally competitive landscape.
- To collaborate with stakeholders by sharing institutional expertise in education and knowledge, fostering mutual growth in technical learning.
- To cultivate an environment that encourages fresh ideas, groundbreaking research, and academic excellence, paving the way for future leaders, innovators, and entrepreneurs.
- To drive socio-economic progress by offering impactful scientific and technological solutions to society.

PROGRAMME EDUCATION OBJECTIVES (PEOs)

PE01: Graduates will build a strong foundation in computer science and engineering principles to excel in higher studies, competitive examinations, and professional careers in the IT industry and academia.

PE02: Graduates will be equipped with analytical, problem-solving, and programming skills that enable them to contribute effectively to the computing industry and adapt to emerging technologies.

PE03: Graduates will engage in research, innovation, and entrepreneurial activities by applying scientific knowledge, tools, and techniques to address real-world and interdisciplinary challenges.

PROGRAMME OUTCOMES (POs)

PO01: Apply knowledge of mathematics, science, engineering fundamentals, and computer science to solve complex engineering problems.

PO02: Identify, formulate, and analyse complex computing and engineering problems using principles of mathematics and science.

PO03: Design and develop software systems and engineering solutions that meet specified needs, considering public health, safety, culture, and environmental concerns.

PO04: Use research-based knowledge and methods including design of experiments, analysis, interpretation of data, and synthesis of information to draw valid conclusions.

PO05: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to solve complex engineering problems with an understanding of the limitations.

PO06: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO07: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO08: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO09: Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

PO10: Communicate effectively on complex engineering activities with the engineering community and society at large, including writing effective reports and design documentation, making effective presentations, and giving and receiving clear instructions.

PO11: Demonstrate knowledge and understanding of engineering and management principles and apply them to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.

PO12: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Graduates will be able to design, develop, test, and deploy software applications using modern programming languages, frameworks, and tools, while following best practices and industry standards.

PSO2: Graduates will be able to apply algorithmic principles, computational theory, data structures, and mathematical foundations to model, analyze, and solve real-world problems.

PSO3**:** Graduates will be able to integrate and manage computer systems, networks, databases, cloud platforms, and AI/ML technologies to create scalable and efficient solutions in various application domains.

Course Structure of B.Tech Computer Science & Engineering

SEMSTER- I

Code No	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BT101	Engineering Mathematics-I	3	1	-	4	30	70	100
BT102	Engineering Physics	4	-	-	4	30	70	100
BT103	Programming in C	4	-	-	4	30	70	100
BT104	Elements of Mechanical Engineering	3	-	-	4	30	70	100
BT105	Basic of Electrical Engineering	3	-	-	4	30	70	100
BT106	Professional Communication Skill	3	-	-	3	30	70	100
	Practical							
BT107L	Engineering Physics Lab	-	-	4	2	15	35	50
BT108L	Programming in C Lab	-	-	4	2	15	35	50
	TOTAL	**20**	**1**	**8**	**27**	**210**	**490**	**700**

SEMESTER- II

Code No	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BT 201	Engineering Mathematics-II	4	1	-	4	30	70	100
BT 202	Engineering Chemistry	4	-	-	4	30	70	100
BT 203	Elements of Civil Engineering and Mechanics	4	-	-	4	30	70	100
BT 204	Computer Aided Engineering Drawing	4	-	-	4	30	70	100
BT 205	Basic Electronics	4	-	-	3	30	70	100
BT 206	Software Engineering	3	1	-	3	30	70	100
	Practical							
BT207L	Engineering Chemistry Lab	-	-	4	2	15	35	50
BT208L	Workshop Practice	-	-	4	2	15	35	50
	TOTAL	**22**	**2**	**8**	**26**	**210**	**490**	**700**

SEMESTER- III

Code No	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BT301	Engineering Mathematics-III	3	1	-	4	30	70	100
BTCSE302	Data Structure using C	4	-	-	4	30	70	100
BTCSE303	Computer Organization & Architecture	4	-	-	4	30	70	100
BTCSE304	Digital Electronics & Logic Design	4	-	-	4	30	70	100
BTCSE305	Formal Languages & Automata Theory	3	-	-	4	30	70	100
BTCSE306	Object Oriented Programming using C++	4	-	-	4	30	70	100
	Practical							
BTCSE 307L	Data Structures Lab	-	-	4	2	15	35	50
BTCSE 308L	C++ Lab	-	-	4	2	15	35	50
	TOTAL	**22**	**2**	**8**	**28**	**210**	**490**	**700**

SEMESTER- IV

Code No	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BT401	Engineering Mathematics – IV	3	1	-	4	30	70	100
BTCSE 402	Microprocessor and Microcontroller	4	-	-	4	30	70	100
BTCSE 403	E-Commerce	4	-	-	4	30	70	100
BTCSE 404	Operating System	4	-	-	4	30	70	100
BTCSE 405	Database Management System	4	-	-	4	30	70	100
BTCSE 406	Web Technology	4	-	-	4	30	70	100
	Practical							
BTCSE407L	DBMS Lab	-	-	4	2	15	35	50
BTCSE408L	Web Technology Lab	-	-	4	2	15	35	50
	TOTAL	**23**	**1**	**8**	**28**	**210**	**490**	**700**

SEMESTER- V

Code No	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BTCSE 501	Cyber law & Information Security	3	1	-	3	30	70	100
BTCSE 502	Operation Research & Optimization Techniques	3	1	-	4	30	70	100
BTCSE 503	Computer Networks	4	-	-	4	30	70	100
BTCSE 504	Java Programming	4	-	-	4	30	70	100
BTCSE 505	Graphics and Image Processing	3	1	-	4	30	70	100
BTCSE 506	Cloud Computing	4	-	-	3	30	70	100
	Practical							
BTCSE 507L	Java Lab	-	-	4	2	15	35	50
BTCSE 508L	Graphics Lab	-	-	4	2	15	35	50
	TOTAL	**21**	**3**	**8**	**26**	**210**	**490**	**700**

SEMESTER- VI

Code No.	Name of Subjects	Periods			Credit	Marks		
		L	T	P		IA	TE	TM
BTCSE601	Search Engine Optimization	3	1	-	4	30	70	100
BTCSE602	Artificial Intelligence	4	-	-	4	30	70	100
BTCSE603	Python Programming	4	-	-	4	30	70	100
BTCSE604	Data Mining and Business Intelligence	3	-	-	4	30	70	100
BTCSE605	Elective - I	-	-	-	3	30	70	100
BTCSE606	**Practical** Summer Training/ Industrial Workshop/ Certification	-	-	4	2	50	50	100
BTCSE607L	SEO Lab	-		4	2	15	35	50
BTCSE608L	Python Programming Lab	-		4	2	15	35	50
Total		**17**	**1**	**12**	**25**	**230**	**470**	**700**

Elective – I
Principles of Programming Languages
Data Analytics
Natural Language Processing
Scripting Languages

SEMESTER- VII

Code No.	Name of Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BTCSE701	Software Testing and Quality Assurance	4	-	-	4	30	70	100
BTCSE702	Parallel Computing	3	1	-	4	30	70	100
BTCSE703	Machine Learning	4	-	-	4	30	70	100
BTCSE704	Embedded Systems	4	-	-	4	30	70	100
BTCSE705	Design and Analysis of Algorithms	4	-	-	4	30	70	100
BTCSE706	Elective -II	3	1		4			
	Practical					30	70	100
BTCSE707L	Software Testing and Quality Assurance Lab	-	-	4	2	15	35	50
BTCSE708L	Machine Learning Lab	-	-	4	2	15	35	50
Total		**22**	**2**	**8**	**28**	**210**	**490**	**700**

Elective -II
Mobile Computing
Soft Computing
Cryptography
Distributed Databases

SEMESTER-VIII

Code No.	Name of Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BTCSE801	Engineering Economics and Management	4	-	-	3	30	70	100
BTCSE802	Compiler Design	4	-	-	4	30	70	100
BTCSE803	ASP.NET	4	-	-	4	30	70	100
BTCSE804	Ethical Hacking and Prevention	3	1	-	4	30	70	100
BTCSE805	Final project Viva Voce	-	-	-	8	100	100	200
	Practical							
BTCSE806L	ASP.NET **Lab**	-	-	4	2	15	35	50
BTCSE807L	Ethical hacking **Lab**			4	2	15	35	50
Total		**15**	**1**	**8**	**27**	**250**	**450**	**700**

SEMSTER- I

Code No	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BT101	Engineering Mathematics-I	3	1	-	4	30	70	100
BT102	Engineering Physics	4	-	-	4	30	70	100
BT103	Programming in C	4	-	-	4	30	70	100
BT104	Elements of Mechanical Engineering	3	-	-	4	30	70	100
BT105	Basic of Electrical Engineering	3	-	-	4	30	70	100
BT106	Professional Communication Skill	3	-	-	3	30	70	100
	Practical							
BT107L	Engineering Physics Lab	-	-	4	2	15	35	50
BT108L	Programming in C Lab	-	-	4	2	15	35	50
	TOTAL	**20**	**1**	**8**	**27**	**210**	**490**	**700**

ENGINEERING MATHEMATICS-I (BT 101)

Subject Code	**BT 101**	**IA Marks**	**30**
Number of Lecture Hours/Week	**04**	**Term End Exam Marks**	**70**
Total Number of Lecture Hours	**60**	**CREDITS**	**04**

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

- n-th derivatives of product of two functions and polar curves.
- Partial derivatives
- Vector calculus
- Reduction formulae of integration; to solve first order differential equations.
- Solution of system of linear equations, quadratic forms.

Module – 1

Differential Calculus -1: Determination of n^{th} order derivatives, Leibnitz's theorem (Without proof)- probles.

Taylor's and Maclaurin's theorems for function of one variable (statement only)- problems. Evaluation of Indeterminate forms.

Partial derivatives – Definition and simple problems, Euler's theorem (without proof) – problems, total derivatives, partial differentiation of composite functions- problems. Definition and evaluation of Jacobians

Module -2

Hours – 12

Differential Calculus -2

Polar Curves - angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Derivative of arc length - Cartesian, Parametric and Polar forms (without proof)- problems. Curvature and Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms (without proof) - problems

Hours - 10

Module-3

Integral Calculus:

Reduction formulae - $\int Sin^n x \ dx, \int Cos^n x \ d, \int Sin^m x \ Cos^n x \ dx$, (m and n are positive integers), evaluation of these integrals with standard limits (0 to $\pi/2$) and problems.

Hours-10

Module-4

First order Differential Equations:

Exact, reducible to exact and Bernoulli's differential equations. Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling.

Hours - 12

Module-5

Linear Algebra

Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss–Jordan method and Gauss-Seidel method, Linear transformation, Eigen values and Eigen vectors. diagonalization of a square matrix. Reduction of Quadratic form

Hours - 11

Course Outcomes:

- **CO-1:** On completion of this course, students are able to Use partial derivatives to calculate rates of change of multivariate functions.
- **CO-2:** Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions.

- **CO-3:** Recognize and solve first-order ordinary differential equations, Newton's law of cooling
- **CO-4:** Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra.

Course Outcome No	Statement	Knowledge Level (KL)
CO1	On completion of this course, students are able to Use partial derivatives to calculate rates of change of multivariate functions	K_1
CO2	Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions	K_3
CO3	Recognize and solve first-order ordinary differential equations, Newton's law of cooling	K_4
C04	Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra.	K_5

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)

K_1-Remember, K_2- Understand, K_3- Apply, K_4- Analyze, K_5- Evaluate, K_6- Create

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			3					2	1		
CO2	2				1		1		3	3		
CO3	3		2	3					1	1		
CO4												
CO Average	2.66		2	3			1		2	1.66		

Text Books:

1. B.S Grewal **"Higher Engineering Mathematics"**, Khanna publishers, 42nd edition, 2013.
2. Erwin Kreyszig, **"Advanced Engineering Mathematics**, Wiley, 2013

Reference Books:

1. B.V. Ramana, **"Higher Engineering Mathematics"**, Tata Mc Graw-Hill, 2006
2. N.P. Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, latest edition.
3. H.K. Dass and Er. Rajnish Verma, **"Higher Engineering Mathematics"**, S.Chand publishing, 1st edition, 2011.

ENGINEERING PHYSICS (BT102)

Subject Code	**BT 102**	**IA Marks**	**30**
Number of Lecture Hours/Week	**04**	**Term End Exam Marks**	**70**
Total Number of Lecture Hours	**60**	**CREDITS**	**04**

Course Objectives:

The Objective of this course is to make students learn and understand basic concepts and principles of physics to analyze practical engineering problems and apply its solutions effectively and meaningfully. To understand building up of models, design issues, practical oriented skills and problem solving challenges are the great task of the course. To know about shock waves and practical applications is the prime motto to introduce new technology at the initial stage of Engineering.

Module-1: Quantum Mechanics

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

Hours-10

Module-2: Semiconductor Physics

Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

Hours-10

Module-3: Optoelectronics

Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

Hours-10

Module-4: Lasers and Fibre Optics

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO_2) laser, He- Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

Hours-15

Module-5: Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

Hours-15

Course Outcomes:

On Completion of this course, students are able to –

CO-1: Learn and understand more about basic principles and to develop problem solving skills and implementation in technology.

CO-2: Gain Knowledge about Modern physics and quantum mechanics will update the basic concepts to implement the skills.

CO-3: Study of material properties and their applications is the prime role to understand and use in engineering applications and studies.

CO-4: Study Lasers and Optical fibers and its applications are to import knowledge and to develop skills and to use modern instruments in the engineering applications.

CO-5: Understand Crystal structure and applications are to boost the technical skills and its applications.

CO-6: Expose shock waves concept and its applications will bring latest technology to the students at the first year level to develop research orientation programs at higher semester level.

CO-7: Understand basic concepts of nano science and technology.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2			1					2
CO2	3	2	1	2								2
CO3	2	1	2	2	1							2
CO4	2	1	3	2	2							2
CO5	2	2		1			1					1
CO6	3	2	2	2								3
CO7	2	2	2	2	2							2
Average	2.43	1.71	1.83	1.71	1.00		1.00					1.86

Text Books:

1. Wiley precise Text, **Engineering Physics,** Wiley India Private Ltd., New Delhi. Book series – 2014,
2. Dr. M.N Avadhanulu, Dr. P.G.Kshirsagar, Text Book of Engineering Physics**,** S Chand Publishing, New Delhi – 2012

PROGRAMMING IN C (BT103)

Subject Code	BT 103	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- Design solutions to simple engineering problem by applying the basic programming principles of C language and basic mathematical knowledge.
- Choose a suitable C-construct to develop C code for a given problem.
- Recognize the bugs in the C program.
- Apply the C-language syntax rules to correct the bugs in the C program.
- Develop simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.

Module 1

Basics of Computer Hardware and Software

Basics of Computer Architecture: processor, Memory, Input& Output devices

Application Software & System software: Compilers, interpreters, High level and low level languages, Introduction to structured approach to programming, Flow chart Algorithms, Pseudo code (*bubble sort, linear search - algorithms and pseudo code*)

Hours-10

Module 2

Program Basics

Basic structure of C program: Character set, Tokens, Identifiers in C, Variables and Data Types, Constants, Console IO Operations, printf and scanf

Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators. Operators Precedence, Preprocessor directive

Control Flow Statements: If Statement, Switch Statement, Unconditional Branching using go to statement, While Loop, Do While Loop, For Loop, Break and Continue statements. (Simple programs covering control flow)

Hours-10

Module 3

Arrays and strings

Arrays Declaration and Initialization, 1-Dimensional Array, 2-Dimensional Array

String processing: In built String handling functions (strlen, strcpy, strcat and strcmp, puts, gets). Linear search program, bubble sort program, simple programs covering arrays and strings

Hours-10

Module 4

Pointers

Basics of Pointer: declaring pointers, accessing data though pointers, NULL pointer, array accessing pointers, pass by reference effect

Hours-10

Module-5

Working with functions

Introduction to modular programming, writing functions, formal parameters, actual parameters Pass by Value, Recursion, Arrays as Function Parameters structure, union, Storage Classes, Scope and life time of variables, *simple programs using functions*

Hours-15

Module 6

Structure & Union

Introduction, Declaration and Initialization, Array of Structures, Unions.

Hours-5

File Handling

File Operations: open, close, read, write, append

Sequential access and random access to files: In built file handling functions (*rewind() fseek(), ftell(),feof(), fread(), fwrite()*), *simple programs covering pointers and files.*

Course Outcomes:

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

CO1: Illustrate and explain the basic computer concepts and programming principles of C language.

CO2: Develop C programs to solve simple mathematical and decision making problems.

CO3: Develop C programs to solve simple engineering problems using looping constructs.

CO4: Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		2					1		2
CO2	3	3	2		2							2
CO3	3	3	3		2							2
CO4	3	3	3	2	3							2
Average	3.0	2.75	2.25	2.0	2.25					1.0		2.0

Text Books

1. Schaum Series, Gottfried B.S.,Tata McGraw Hill,Programming with C
2. E. Balagurusamy, Mcgraw Hill,Programming in ANSI C
3. Asok N Kamthane, Pearson,Programming in C
4. Anita Goel, Pearson, Computer Fundamentals

ELEMENTS OF MECHANICAL ENGINEERING (BT104)

Subject Code	BT104	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course objectives:

- Students belonging to all branches of Engineering are made to learn certain fundamental topics related to mechanical engineering so that they will have a minimum understanding of mechanical systems, equipment and process.

Module -1

Energy Resources: Non-renewable and renewable energy resources, Petroleum based solid, liquid and gaseous fuels, Calorific values of fuels, Combustion and combustion products of fuels.

Solar Power: Solar Radiation, Solar constant (definition only), Solar Thermal energy harvesting, ex: liquid flat plate collectors, solar ponds (principle of operation only), Solar photovoltaic principle.

Wind Power: principle of operation of a typical windmill.

Hydro Power: Principles of electric power generation from hydro power plants,

Nuclear Power: Principles of Nuclear power plants,

Bio Fuels: introduction to bio fuels, examples of various biofuels used in engineering applications, Comparison of biofuels withpetroleum fuels in terms of calorific value and emission.

Hours-10

Module- 2

Turbines and IC Engines and Pumps Steam turbines: Classification, Principle of operation of Impulse and reaction turbines, Gas turbines: Classification, Working principles and Operations of Open cycle and closed cycle gas turbines.

Water turbines: Classification, Principles and operations of Pelton wheel, Francis turbine and Kaplan turbine

Internal Combustion Engines: Classification, I.C. Engines parts, 2 Stroke and 4 stroke Petrol engines, 4 stroke diesel engines. P-V diagrams of Otto and Diesel cycles. Problems on indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency, and specific fuel consumption.

Hours-10

Module- 3

Machine Tools Operations: Turning, facing, knurling, Thread cutting, Taper Turning,

Drilling, Boring, Reaming, Tapping, Counter Sinking, Counter Boring, - Plane milling, End milling, Slot milling. (No sketches of Machine tools, sketches to be used only for explaining operations.)

Hours-10

Module-4

Engineering materials and joining processes: Engineering Materials: Types and applications of Ferrous & Nonferrous metals and alloys, Composites: Definition, Classification and applications (Air craft and Automobiles)

Soldering, Brazing and Welding:

Definitions, classification and method of soldering, Brazing and welding. Differences between soldering, Brazing and Welding. Description of Electric Arc Welding and Oxy-Acetylene Welding.

Hours-15

Module-5

Refrigeration, Air-Conditioning:

Refrigerants: properties of refrigerants, list of commonly used refrigerants. Refrigeration – Definitions – Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, unit of Refrigeration. Principle and working of vapor compression refrigeration and vapour absorption refrigeration: Principles and applications of air conditioners, Room air conditioner.

Hours-15

Course Outcomes:
Students shall demonstrate knowledge associated with,

CO-1: Various Energy sources, Boilers, Prime movers such as turbines and IC engines, refrigeration and air-conditioning systems
CO-2: Metal removal process using Lathe, drilling, Milling Robotics and Automation.
CO-3: Fair understanding of application and usage of various engineering materials.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	2					2
CO2	3	2	3	2	3						2	2
CO3	2	2	2		2		2					2
Average	2.67	2.0	2.33	1.33	2.33	0.67	1.33				0.67	2.0

Text Books:

1. V.K.Manglik, "Elements of Mechanical Engineering", PHI Publications, 2013. (Module-1,2,4,5)
2. Mikell P.Groover, "Automation, Production Systems & CIM", 3rd Edition, PHI (Module -3)
3. K.R.Gopalkrishna, "A text Book of Elements of Mechanical Engineering"- Subhash Publishers, Bangalore. (Module -1,2,3,4,5)

BASIC OF ELECTRICAL ENGINEERING (BT105)

Subject Code	**BT105**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course objectives:

- Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
- Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
- Develop selection skill to identify the type of generators or motors required for particular application.
- Highlight the importance of transformers in transmission and distribution of electric power.
- Emphasize the effects of electric shock and precautionary measures.
- Improve the ability to function on multi-disciplinary teams.

Module -1

Ohm's law and Kirchhoff's laws, analysis of series, parallel circuit by independent voltage sources, concept of power and energy, definition of magnetic circuit and analogy between electric and magnetic circuits, faradays laws of electromagnetic induction, concept of Network Theorem.

Hours-10

Module -2

Single Phase A.C. Circuits: Average value, R.M.S. value, form factor and peak factor for sinusoidal wave form, Steady State Analysis of series R-L-C circuits. Concept of Reactance, Impedance, Susceptance, Admittance, Concept of Power Factor, Real, Reactive and Complex power, Illustrative Problems

Hours-15

Module - 3

Single phase transformers: principle of operation, constructional features and emf equation. DC. Generator: principle of operation, constructional features, emf equation.
DC Motor: principle of operation, Back emf, torque equation.

Hours-10

Module- 4

Three phase Induction Motor: principle of operation, types; Synchronous Machines: principle of operation of Synchronous generator and motor. EMF equation, Voltage regulation, Applications and starting of Synchronous motor. Introduction to single-phase induction Motor.

Hours-10

Module-5

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption and battery backup.
Measuring Instruments: Construction and Principle of operation of dynamometer type wattmeter and single-phase induction type energy meter

Hours-15

Course Outcomes:
After the completion of the course, the student should be able
CO-1: To predict the behaviour of electrical and magnetic circuits.
CO-2: Select the type of generator / motor required for a particular application.
CO-3: Realize the requirement of transformers in transmission and distribution of electric power and other applications.
CO-4: Practice Electrical Safety Rules & standards.
CO-5: To function on multi-disciplinary teams.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1:	3	3	2	2								2
CO2	2	2	2									2
CO3:	2	2	3		1							2
CO4	2	1				3		3				2
CO5:									2	2	3	2
Average	2.25	2.00	2.33	1.00	1.00	1.50		1.50	2.00	2.00	3.00	2.00

Text books:

1. V. N. Mittal and Arvind Mittal;, " Basic Electrical Engineering" McGraw Hill
2. Vincent DelToro, " Electrical engineering Fundamentals", PHI second edition 2011
3. Bolestaad, :"Electronics Devices and Circuits Theory", Pearson Education India
4. Edward Hughes, " Electrical Technology,", Pearson Education
5. D.P. Kothari and Nagrath " Theory and Problems in electrical Engineering", PHI edition 2011

PROFESSIONAL COMMUNICATION SKILL (BT106)

Subject Code	BT106	IA Marks	30
Number of Lecture Hours/Week	03	Term End Exam Marks	70
Total Number of Lecture Hours	45	CREDITS	03

Course Objective:
To enable students how to improve communication skills.

- To develop Writing skills in preparing business letters, report, memos, and proposals. To develop Oratory skills through public speaking. To understand importance of professional attire in corporate environment.
- To get knowledge on various business etiquette and inculcate the etiquette for corporate fit.

Module-1: Concepts of Communications

Introduction: Definition and Process of Communication - Forms of Verbal and Non-verbal Communication.
Barriers of Communication: Communication Barriers and Overcoming Communication Barriers - Guidelines for Effective Communication.
Business Writing: Direct and Indirect approaches to Business Writing - Five Main Stages of Writing Business Messages.
Exercise: Role Play, Square Talk Activity.

Hours-10

Module-2: Written Business Communication

External Communication: The Seven C's of Letter writing - Kinds of Business Letters - Business Reports and Proposals - Purpose of Business Reports.
Internal Communication: Format and Principles of Writing Memos - General Warning - Cautions.
Exercise: Preparation of Reports on different issues.

Hours-10

Module-3: Oral Communication

Public Speaking: Types of Public Speaking - importance of Public Speaking.
Power Point Presentation: Planning the Presentation - Delivering the Presentation - Developing & Displaying Visual Aids - Handling Questions from the Audience.
Listening: Definition - Types of Listening Skills - Features of a Good Listener - Causes and effects of Poor Listening.
Exercise: Elocution and Extempore

Hours-10

Module-4: Behavioral Techniques

Body Language: Facial Expressions - Body Posture - Gestures - Eye Movement - Touch and the use of Personal Space.
Business Attire and Grooming: Different types of Attire - Guidelines for Business Attire. Exercise: Power of Body Language, Charades.

Hours-5

Module-5: Etiquettes

Etiquettes: Greeting Etiquette - Corporate Etiquette - Telephone Etiquette - E-mail Etiquette – Meeting Etiquette - Netiquette - Personal Etiquette - Social Etiquette - Dining Etiquette. Exercise: Introduction and Art of Conversation, Telephonic Activity.

Hours-10

Course Outcomes:
At the end of the course, the students would be able to:

CO-1: Develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others.
CO-2: Understand and practice different techniques of communication.
CO-3: Practice and adhere to the 7Cs of Communication.
CO-4: Familiarize with different types of Communication.
CO-5: Understand and practice Interview Etiquettes.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	CO Avg
CO1:									3	3	2	2	2.50
CO2									2	3		2	2.33
CO3:									2	3			2.50
CO4									2	3			2.50
CO5:						2		3	2	3		2	2.43
Average						2.00		3.00	2.20	3.00	2.00	2.00	

TEXT BOOKS:

1. Meenakshi Raman and Prakash Singh, Business Communication, Oxford
2. **Lesikar:** Basic Business Communication, TMH
3. **David Irwin:** Effective Business Communications, Viva- Thorogood. Rajendra Pal, J S Korlaha
4. **HI:** Essentials of Business Communication: Sultan Chand & Sons, New Delhi

2nd SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BT 201	Engineering Mathematics-II	3	1	-	4	30	70	100
BT 202	Engineering Chemistry	4	-	-	4	30	70	100
BT 203	Elements of Civil Engineering and Mechanics	4	-	-	4	30	70	100
BT 204	Computer Aided Engineering Drawing	4	-	-	4	30	70	100
BT 205	Basic Electronics	4	-	-	3	30	70	100
BT 206	Software Engineering	3	1	-	3	30	70	100
	Practical							
BT 207L	Engineering Chemistry **Lab**	-	-	4	2	15	35	50
BT 208L	Workshop Practice	-	-	4	2	15	35	50
	Total	**22**	**2**	**8**	**26**	**210**	**490**	**700**

ENGINEERING MATHEMATICS-II (BT201)

Subject Code	**BT201**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course objectives:

To enable students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following

- Ordinary differential equations
- Partial differential equations
- Double and triple integration
- Laplace transform

Module – I

Linear differential equations with constant coefficients: Solutions of second and higher order differential equations - operator method, method of undetermined coefficients and method of variation of parameters.

Hours-10

Module -2

Differential equations-2:

Linear differential equations with variable coefficients: Solution of Cauchy's and Legendre's linear differential equations.

Nonlinear differential equations - Equations solvable for p, equations solvable for y, equations solvable for x, general and singular solutions, Clairauit's equations and equations reducible to Clairauit's form.

Hours-10

Module – 3

Partial Differential equations:

Formulation of Partial differential equations by elimination of arbitrary constants/functions, solution of non-homogeneous Partial differential equations by direct integration, solution of homogeneous Partial differential equations involving derivative with respect to one independent variable only.

Derivation of one dimensional heat and wave equations and their solutions by variable separable method.

Hours-10

Module-4

Integral Calculus:

Multiple integrals: Beta and Gamma functions: definitions, Relation between beta and gamma functions and simple problems.

Evaluation of double and triple integrals. Evaluation of double integrals by changing the order of integration and by changing into polar co-ordinates. Applications of multiple integrals to find area and volume.

Hours-15

Module-5

Laplace Transform

Definition and Laplace transforms of elementary functions, Linearity, first and second shifting, change of scale.

Laplace transforms of derivatives, integral, multiplication and division by ***t,*** periodic functions.

Inverse Laplace Transform

Inverse Laplace Transform - problems, Convolution theorem to find the inverse Laplace transforms (without proof) and problems, solution of linear differential equations using Laplace Transforms.

Hours-15

Course Outcomes:

On completion of this course, students are able to,

CO-1: Solve differential equations of electrical circuits, forced oscillation of mass springand elementary heat transfer.
CO-2: Solve partial differential equations fluid mechanics, electromagnetic theory andheat transfer.
CO-3: Evaluate double and triple integrals to find area, volume, mass and moment ofinertia of plane and solid region.
CO-4: Use curl and divergence of a vector valued functions in various applications of electricity, magnetism and fluid flows.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2								2
CO2	3	2	3	2								2
CO3	3	2	2	2								2
CO4	3	2	2	2								2
Average	3.0	2.0	2.5	2.0								2.0

Text Books:

1. B. S. Grewal," Higher Engineering Mathematics", Khanna publishers,42nd edition, 2013.
2. Kreyszig, "Advanced Engineering Mathematics " -Wiley, 2013

Reference Books:

1. B.V.Ramana "Higher Engineering M athematics" Tata Mc Graw-Hill, 2006

2. N P Bali and Manish Goyal, "A text book of Engineering mathematics" , Laxmi publications, latest edition.

3. H. K Das and Er. Rajnish Verma ,"Higher Engineering Mathematics", S. Chand publishing,1st edition, 2011.

ENGINEERING CHEMISTRY (BT202)

Subject Code	**BT202**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course objectives:

To provide students with knowledge of engineering chemistry for building technical competence in industries, research and development in the following fields

- Electrochemistry & Battery Technology.
- Corrosion & Metal Finishing.
- Fuels & Solar energy.
- Polymers.
- Water Technology & Nano Materials.

Module -1

Electrochemistry and Battery Technology

Electrochemistry: Introduction, Derivation of Nernst equation for electrode potential. Reference electrodes: Introduction, construction, working and applications of calomel and Ag / AgCl electrodes. Measurement of electrode potential using calomel electrode. Ion selective electrode: Introduction; Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrolyte concentration cells, numerical problems.

Battery Technology: Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency, cycle life and shelf life. Construction, working and applications of Zinc- Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, construction, working and applications of Li-MnO_2 and Li-ion batteries.

Fuel Cells: Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte.

Hours-15

Module -2

Corrosion and Metal Finishing:

Corrosion: Introduction, electrochemical theory of corrosion, galvanic series. Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity, and temperature. Types of corrosion- Differential metal, differential aeration (Pitting and water line) and stress. Corrosion control: Inorganic coatings- Anodizing of Al and phosphating; Metal coatings-Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods).

Metal Finishing: Introduction, Technological importance. Electroplating: Introduction, principles governing-Polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit-current density, concentration of metal ion & electrolyte; pH, temperature & throwing power of plating bath; additives- brighteners, levellers, structure modifiers & wetting agents. Electroplating of Nickel (Watt's Bath) and Chromium(decorative and hard). Electro less plating: Introduction, distinction between electroplating and electro less plating, electro less plating of copper & manufacture of double sided Printed Circuit Board with copper.

Hours-15

Module – 3

Fuels and Solar Energy:

Fuels: Introduction, classification, calorific value- gross and net calorific values, determination of calorific value of fuel using bomb calorimeter, numerical problems. Cracking: Introduction, fluidized catalytic cracking, synthesis of petrol by Fishcher-Tropsch process, reformation of petrol, octane and cetane numbers., anti knocking agents, power alcohol & biodiesel.

Solar Energy: Introduction, utilization and conversion, photovoltaic cells- construction and working. Design of PV cells: modules, panels & arrays. Advantages & disadvantages of PV cells. Production of solar grade silicon: Union carbide process, purification of silicon (zone refining), doping of silicon-diffusion technique (n&p types).

Hours-10

Module - 4

Polymers:

Introduction, types of polymerization: addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average, numerical problems. Glass transition temperature (Tg): Factors influencing Tg-Flexibility, inter molecular forces, molecular mass, branching & cross linking and stereo regularity. Significance of Tg. Structure property relationship: crystallinity, tensile strength, elasticity & chemical resistivity. Synthesis, properties and applications of PMMA (plexi glass), Polyurethane and polycarbonate. Elastomers: Introduction, synthesis, properties and applications of Silicone rubber.

Hours-10

Module-5

Water Technology and Nano materials:

Water Technology: Introduction, boiler troubles with disadvantages & prevention methods-scale and sludge formation, priming and foaming, boiler corrosion(due to dissolved O2, CO2 and MgCl2). Determination of DO, BOD and COD, numerical problems on COD. Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion exchange process

Nano Materials: Introduction, properties (size dependent). Synthesis-bottom up approach (sol-gel, precipitation, gas condensation & chemical vapour condensation processes). Nano scale materials-carbon nano tubes, nano wires, fullerenes, dendrimers, nano rods, & nano composites.

Hours-10

Course Outcomes:

On completion of this course, students will have knowledge in:

CO-1: Electrochemical and concentration cells. Classical & modern batteries and fuel cells.
CO-2: Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electro less plating.
CO-3: Production & consumption of energy for industrialization of country and living standards of people. Utilization of solar energy for different useful forms of energy.
CO-4: Replacement of conventional materials by polymers for various applications.
CO-5: Boiler troubles; sewage treatment and desalination of sea water,
CO-6: Over viewing of synthesis, properties and applications of Nano materials.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1:	3	2	2	2	2							2
CO2:	3	2	3	2	2	2	2					2
CO3:	3	2	2		2	2	2					2
CO4:	2	1	2		2							2
CO5:	3	2	2		2	2						2
Average	2.80	1.80	2.20	1.00	2.00	1.20	1.00					2.00

Text Books:

1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah & Pushpa Iyengar, **"Chemistry for Engineering Students"**, Subhash Publications, Bangalore.
2. R.V.Gadag & A.Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi.
3. P.C.Jain & Monica Jain.,**"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi.

Reference Books:

1. O.G.Palanna,**"Engineering Chemistry"**,Tata McGraw Hill Education Pvt.Ltd. New Delhi, Fourth Reprint.
2. G.A.Ozin & A.C. Arsenault, **"Nanochemistry A Chemical Approach to Nanomaterial's"**, RSC publishing, 2005.
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition.

ELEMENTS OF CIVIL ENGINEERING AND MECHANICS (BT203)

Subject Code	BT203	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

The objectives of this course is to make students to learn basics of Civil Engineering concepts and infrastructure development, solve problems involving Forces, loads and Moments and know their applications in allied subjects. It is a pre-requisite for several courses involving Forces, Moments, Centroids, Moment of inertia and Kinematics.

Module 1: Introduction to Civil Engineering & Engineering Mechanics

Introduction to Civil Engineering

Scope of different fields of Civil Engineering - Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering.

Infrastructure: Types of infrastructure, Role of Civil Engineer in the Infrastructural Development, Effect of the infrastructural facilities onsocio-economic development of a country. Roads: Classification of Roads and their functions, Comparison of Flexible and Rigid Pavements (Advantages and Limitations)

Bridges: Types of Bridges and Culverts, RCC, Steel and Composite Bridges

Dams: Different types of Dams based on Material, Structural behavior and functionality with simple sketches.

Introduction to Engineering Mechanics: Basic idealizations - Particle, Continuum and Rigid body; Newton's laws-Force and its characteristics, types of forces-Gravity, Lateral and its distribution on surfaces, Classification of force systems, Principle of physical independence, superposition, transmissibility of forces, Introduction to SI units. Couple, Moment of a couple, Characteristics of couple, Moment of a force, Equivalent force - Couple system; Numerical problems on moment of forces and couples, on equivalent force - couple system.

Hours-15

Module 2: Analysis of Concurrent Force Systems

Concepts: Resultants and Equilibrium

Composition of forces - Definition of Resultant; Composition of coplanar - concurrent force system, Parallelogram Law of forces, Principle of resolved parts; Numerical problems on composition of coplanar concurrent force systems.

Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem; Numerical problems on equilibrium of coplanar –

concurrent and non-concurrent force systems.

Application- Static Friction in rigid bodies in contact

Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; Impending motion on horizontal and inclined planes; Numerical Problems on single and two blocks on inclined planes

Hours-15

Module - 3 Analysis of Non-Concurrent Force Systems

Concepts: Resultants and Equilibrium

Composition of coplanar - non-concurrent force system, Varignon's principle of moments; Numerical problems on composition of coplanar non-concurrent Force system.

Application-Support Reaction in beams

Types of Loads and Supports, statically determinate beams, Numerical problems onsupport reactions for statically determinate beams with Point load (Normal and inclined) and uniformly distributed and uniformly varying loads and Moments.

Hours-10

Module - 4 Centroids and Moments of Inertia of Engineering Sections:
Centroids

Introduction to the concept, centroid of line and area, centroid of basic geometrical figures, computing centroid for–T,L,I,Z and full/quadrant circular sections and their built up sections. Numerical problems

Moment of Inertia

Introduction to the concept, Radius of gyration, Parallel axis theorem, Perpendicular axis theorem, Moment of Inertia of basic planar figures, computing moment of Inertia for – T, L, I, Z and full/quadrant circular sections and their built up sections. Numerical problems

Hours-10

Module 5: Kinematics

Concepts and Applications

Definitions – Displacement – Average velocity – Instantaneous velocity – Speed – Acceleration - Average acceleration – Variable acceleration – Acceleration due to gravity – Newton's Laws of Motion.

Rectilinear Motion–Numerical problems.

Curvilinear Motion – Superelevation – Projectile Motion – Relative motion – Numerical problems.

Motion under gravity – Numerical problems.

Hours-10

Course Outcomes:

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

CO-1: Know basics of Civil Engineering, its scope of study, knowledge about Roads, Bridges and Dams;

CO-2: Comprehend the action of Forces, Moments and other loads on systems of rigid bodies;

CO-3: Compute the reactive forces and the effects that develop as a result of the external loads;

CO-4: Locate the Centroid and compute the Moment of Inertia of regular cross- sections.

CO-5: Express the relationship between the motions of bodies.

CO-6: Equipped to pursue studies in allied courses in Mechanics.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2				2	2	1				1
CO2	3	2	2	2								2
CO3	3	2	2	2	1							2
CO4	3	2	2	1								1
CO5	2	2	1	1								2
CO6	3	2	2	1								2
Avg	2.83	2.0	1.83									

TEXT BOOKS:

1. Elements of Civil Engineering and Engineering Mechanics by M.N. Shesha Prakash and Ganesh. B. Mogaveer, PHI Learning, 3rd Revised edition (2014)

2. Engineering Mechanics-Statics and Dynamics by A Nelson, Tata McGraw Hill Education Private Ltd, New Delhi, 2009.

3. Elements of Civil Engineering (IV Edition) by S.S. Bhavikatti, New Age International Publisher, New Delhi, 3rd edition 2009.

REFERENCES:

1. Engineering Mechanics by S.Timoshenko, D.H.Young, and J.V.Rao, TATA McGraw-Hill Book Company, New Delhi
2. Beer FP and Johnson ER, "Mechanics for Engineers- Dynamics and Statics"- 3rd SI Metric edition, Tata McGraw Hill. - 2008

COMPUTER AIDED ENGINEERING DRAWING (BT204)

Subject Code	BT204	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course objectives:

- Engineering drawing is an important tool for all Engineers and for many others professionals. It is the language of Engineers. Engineering Drawing communicates all needed information from the engineer who designed a part to the workers who will manufacture it.
- The aim of the subject is to equip students with the fundamentals of Computer Aided Engineering Drawing and to further the ability to communicate information by graphical means.

Module -1

Introduction to Computer Aided Sketching

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. of HP, VP, RPP & LPP. of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering.

Hours-15

Module -2

Orthographic projections

Introduction to Orthographic projections. Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only). Dimensioning technique as per SP-46. Conversion of orthographic views into isometric View/projection (Simple objects). Projection of Straight Lines and Planes. (First Angle Projection Method Only). Lines inclined to one reference plane only and limited to both ends in One quadrant.

Hours-15

Module-3

Projections of Planes (First angle Projection only)

Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions

Hours-5

Module-4

Projections of Solids (First angle Projection only)

Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions (No problems on octahedrons and combination solid).

Hours-10

Module-5

Isometric Projection (Using Isometric Scale Only)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three solids).

Hours-15

Course Outcomes:

After studying this course,

CO -1: Students will be able to demonstrate the usage of CAD software.

CO-2: Students will be able to visualize and draw Orthographic projections, Sections of solids and Isometric views of solids.

CO-3: Students are evaluated for their ability in applying various concepts to solve practical problems related to engineering drawing.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	3							2
CO2	3	2	2	2	3							2
CO3	3	2	3	2	3							2
Avg	2.67	1.67	2.33	2.0	3.0							2.0

TEXT BOOKS:

1. Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.

2. "Computer Aided Engineering Drawing"by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Premkumar Fifth edition, New Age International Publishers

REFERENCE BOOKS:

1. Computer Aided Engineering Drawing – S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
2. Engineering Graphics - K.R. Gopalkrishna, 32nd edition, 2005- Subash Publishers Bangalore.

BASIC ELECTRONICS (BT205)

Subject Code	**BT205**	**IA Marks**	30
Number of Lecture Hours/Week	03	**Term End Exam Marks**	70
Total Number of Lecture Hours	45	**CREDITS**	03

Course Objectives:

- To study in detail about construction of several electronic devices.
- To analyses the characteristics of various electronic devices and circuits.
- To understand the internal structure and characteristics of Op-amp.
- To learn about the linear and non-linear applications of Op-amp.

Module – 1: Semi-Conductors and Diodes:

Conductors, Semiconductors, Intrinsic Semiconductors, Extrinsic Semi-Conductors. Diode Theory: Basic Ideas, The ideal Diode, Forward and Reverse Bias, Diode Equation, Volt-Ampere Characteristic. Special diodes: symbol of zener diode, operation, V-I characteristics, symbol of photo diode, working principle, LED symbol and principle. **Hours-10**

Module – 2: Rectifiers:

Half-wave Rectifier, Full-wave and Bridge Rectifier, derivation of Ripple factor, efficiency of Half-wave, full-wave and Bridge rectifiers. Merits and demerits of Half-wave, full-wave and Bridge rectifiers, Comparisons of rectifiers. **Hours-10**

Module- 3: Bipolar Junction Transistors:

Symbols of pnp and npn transistors and their working principles, Transistor currents, input and output characteristics of Common base configuration, Common Emitter configuration Transistor Switch, Amplifiers: working principles of Common base amplifier, Common Emitter amplifier, Common collector amplifier and their applications.

Hours-15

Module- 4 Characteristics of Op-Amps:

Introduction to OP-amp, Op-amp Block Diagram, ideal and practical Op-amp specifications, 741 op- amp & its features, Op-Amp parameters & Measurement, Input & Out put off set voltages & currents, slew rates, CMRR, PSRR.

Hours-7

Module-5: Applications of Op-Amps:

Inverting and Non-inverting amplifier, Integrator and differentiator, Comparators.

Course Outcomes:

Students will be able to

CO-1: Understand the semiconductor physics of the intrinsic, p and n materials

CO-2: Understand the function and operation of diodes, transistors and amplifiers.

CO-3: Students will be aware of the architecture, functions & their applications of IC 741 OP-Amp

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2									2
CO2	3	2	3	1								2
CO3	3	2	3	2	2							2
Avg	3.0	2.0	2.67	1.0	0.67							2.33

Text Books:

1. Electronic Principles, Albert Malvino and David J Bates, 7th Edition, Tata McGraw –Hill.

2. Electronic Devices and Circuits Theory, Boyelstad, Pearson Education, 8th Edition, September 2011.

3. Op-Amps and Linear Integrated Circuits , - Ramakanth A. Gayakwad, PHI, 4th Edition, 2009

4. Linear Integrated Circuits – D. Roy Chowdhury, New Age International Pvt.Ltd., 2nd Edition, 2003.

SOFTWARE ENGINEERING (BT206)

Subject Code	BT206	IA Marks	30
Number of Lecture Hours/Week	03	Term End Exam Marks	70
Total Number of Lecture Hours	50	CREDITS	03

Course Objectives:

- Understand the software life cycle models
- Understand the importance of the software development process
- Understand the importance of modeling and modeling languages
- Design and develop correct and robust software products

Module-I

Introduction:
Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

Hours-10

Module-II

Software Requirement Specifications (SRS) Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS.
Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

Hours-10

Module-III

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

Hours-10

Module-IV

Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom- Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

Hours-10

Module-V

Software Maintenance and Software Project Management Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

Hours-10

Course Outcomes:

At the end of the course the student should be able to:

CO 1: Identify the need for engineering approach to software development and various processes of requirements analysis for software engineering problems.

CO 2: Analyze various software engineering models and apply methods for design and development of software projects.

CO 3: Work with various techniques, metrics and strategies for Testing software projects.

CO 4: Identify and apply the principles, processes and main knowledge areas for Software Project Management

CO 5: Proficiently apply standards, CASE tools and techniques for engineering software projects

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2									2
CO2	3	2	3	2	2							2
CO3	3	2	3	3	2							2
CO4	2	2	3	2	2						2	2
CO5	2	2	3	2	2						2	2
Avg	2.6	2.0	2.8	1.8	1.6						2.0	2.0

Text books:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
1. 4. Pankaj Jalote, Software Engineering, Wiley 5.Deepak Jain,"Software Engineering:Principles and Practices", Oxford University Press.

SEMESTER- III

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BT 301	Engineering Mathematics – III	3	1	-	4	30	70	100
BTCSE 302	Data Structure using C	4	-	-	4	30	70	100
BTCSE 303	Computer Organization & Architecture	4	-	-	4	30	70	100
BTCSE 304	Digital Electronics & Logic Design	4	-	-	4	30	70	100
BTCSE 305	Formal Languages & Automata Theory	3	1	-	4	30	70	100
BTCSE 306	Object Oriented Programming using C++	4	-	-	4	30	70	100
	Practical							
BTCSE 307L	Data Structures **Lab**	-	-	4	2	15	35	50
BTCSE 308L	C++ **Lab**	-	-	4	2	15	35	50
	Total	**22**	**2**	**8**	**28**	**210**	**490**	**700**

ENGINEERING MATHEMATICS – III (BT-301)

Subject Code	**BT301**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS - 04**	04

Course objectives:

This course will enable students to

- Comprehend and use of analytical and numerical methods in different engineering fields
- Apprehend and apply Fourier Series
- Realize and use of Fourier transforms and Z-Transforms
- Use of statistical methods in curve fitting applications
- Use of numerical methods to solve algebraic and transcendental equations, vector integration and calculus of variation

Module – I

VECTOR DIFFERENTIATION

Scalar and vector point functions – Del applied to scalar point functions – Directionalderivative – Del applied to vector point functions – Physical interpretation of divergence and curl – Del applied twice to point functions – Del applied to products of point functions.

Hours-10

Module – II

VECTOR INTEGRATION

Integration of vectors – Line integral, circulation, work done – Surface integral, flux – Green's theorem in the plane – Stoke's theorem – Volume integral – Gauss divergence theorem (all theorems without proofs) – Irrotational and solenoidal fields.

Hours-10

Module – III

PARTIAL DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS

Introduction – Formation of partial differential equations by eliminating arbitrary constants and functions – Solutions of a partial differential equations by direct Integration – Linear equations of the first order (Lagrange's linear equations).

Applications: Method of separation of variables – Vibrations of a stretched string: Wave equation – One dimensional heat flow equation ($\partial u/\partial t=c^{2} (\partial^2 u)/(\partial x^2)$), and two dimensional heat flow equation (i.e. Laplace equation : $(\partial^2 u)/(\partial x^2)+(\partial^2 u)/(\partial y^2)=0$).

Hours-15

Module – IV

FOURIER SERIES

Introduction – Euler's formulae – Conditions for a Fourier expansion – Functions having points of discontinuity – Change of interval – Even and odd functions – Half range series – Parseval's formula.

Hours-10

Module – V

FOURIER TRANSFORMS

Introduction – Definition – Fourier integral theorem (without proof) - Fourier sine and cosine integrals – Fourier transforms – Properties of Fourier transforms – Convolution theorem – Parseval's identity for Fourier transforms – Relation between Fourier and Laplace transforms

– Fourier transforms of the derivatives of a function – Applications of transforms to boundary value problems.

Hours-15

Course Outcomes:

The student will be able to:

CO– 1: Apply gradient, divergence & curl to scalar and vector point functions and also physically interpret their meaning.

CO- 2: Apply the concepts of Vector calculus & the corresponding theorems to evaluate line, surface and flux integrals.

CO- 3: Solve both first & higher order partial differential equations by different techniques and apply to two dimensional heat conduction equations, vibrations of a string etc.

CO- 4: Apply infinite Fourier series to represent discontinuous function which occurs in signal processing & electrical circuits.

CO- 5: Apply the principles of Fourier transforms to Boundary value problems.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2								2
CO2	3	2	2	2								2
CO3	3	2	2	2								2
CO4	3	2	2	2								2
CO5	3	2	2	2								2
Avg	3.0	2.0	2.0	2.0								2.0

Test Books:

1. Peter V. O'Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
2. Jain, Iyenger & Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi.
3. JN Kapur, Mathematical Statistics, S. Chand & company Ltd.
4. BS Grewal, Higher Engineering Mathematics, Khanna Publishers.

DATA STRUCTURE using C (BTCSE-302)

Subject Code	**BTCSE302**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course objectives:

This course will enable students to

The objective of the course is to introduce the fundamentals of Data Structures, Abstract concepts and how these concepts are useful in problem solving. After completion of this course student will be able to –

- Analyze step by step and develop algorithms to solve real world problems.
- Implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs.
- Understanding various searching & sorting techniques

Modu1e -1

Basics

Algorithm Specifications: Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis).

Hours-5

Introduction to Data Structure:

- Data Management concepts,
- Data types – primitive and non-primitive,
    - Types of Data Structures- Linear & Non Linear Data Structures. **Hours-5**

Module-2

Linear Data Structure

- **Array:** Representation of arrays, Applications of arrays, sparse matrix and its representation.
- **Stack:** Stack-Definitions & Concepts, Operations on Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression and their compilation,Recursion, Tower of Hanoi.

- **Queue:** Representation of Queue, Operations On Queue,Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue.
- **Linked List:** Singly Linked List, Doubly Linked list, Circular linked list, linked implementation of Stack, linked implementation of Queue, Applications of linked list.

Hours-15

Module-3

Nonlinear Data Structure

- Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder),
- Threaded binary tree,
- Binary search trees,
- Conversion of General Trees to Binary Trees,
- Applications of Trees- Some balanced tree mechanism,eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance
- Graph-Matrix Representation of Graphs, Elementary Graph operations (Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree

Hours-15

Module-4

Sorting and Searching

- Insertion Sort
- Quick Sort
- Merge Sort
- Radix Sort
- Sorting On Several Keys
- List and Table Sort
- Linear Search
- Binary Search

Hours-10

Module-5

Hashing and File Structures

- Hashing: The symbol table,
- Hashing Functions,
- Collision-Resolution Techniques,
- File Structure: Concepts of fields, records and files,

- ➢ Sequential, Indexed and Relative/Random File Organization,
- ➢ Indexing structure for index files,
- ➢ hashing for direct files,
- ➢ Multi-Key file organization and access methods.

Hours-10

Course Outcomes:

The student will:

CO– 1: Be able to check the correctness of algorithms using inductive proofs and loop invariants.

CO– 2: Be able to compare functions using asymptotic analysis and describe the relative merits of worst-, average-, and best-case analysis.

CO– 3: Be able to solve recurrences using the master, the iteration, and the substitution method.

CO– 4: Become familiar with a variety of sorting algorithms and their performance characteristics (eg, running time, stability, space usage) and be able to choose the best one under a variety of requirements.

CO– 5: Be able to understand and identify the performance characteristics of fundamental algorithms and data structures and be able to trace their operations for problems such as sorting, searching, selection, operations on numbers, polynomials and matrices, and graphs.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2								2
CO2	3	2	3	2	2							2
CO3	3	2	2	2	1							2
CO4	3	2	3	2	2							2
CO5	3	2	2	2	1							2
Avg	3.0	2.0	2.6	2.0	1.2							2.0

TEXT BOOKS:

1. Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson Freed, Universities Press.
2. Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI.
3. Aaron M. Tenenbaum,YedidyahLangsam and Moshe J. Augenstein “Data Structures Using C and C++”, PHI Learning Private Limited, Delhi India
4. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publications Pvt Ltd Delhi India

COMPUTER ORGANIZATION & ARCHITECTURE (BTCSE-303)

Subject Code	**BTCSE303**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

COURSE OBJECTIVES:

To expose the students to the following:

- How Computer Systems work & the basic principles
- Instruction Level Architecture and Instruction Execution
- The current state of art in memory system design
- How I/O devices are accessed and its principles.
- To provide the knowledge on Instruction Level Parallelism

Module I

Basic Functional units of Computers: Functional units, basic Operational concepts, Bus structures. Software, Performance, Multiprocessors, Multicomputer.

Data Representation: Signed number representation, fixed and floating point Representations.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms. Error detection and correction codes.

Hours-10

Module II

Register Transfer Language and Micro Operations: RTL- Registers, Register transfers, Bus and memory transfers. Micro operations: Arithmetic, Logic, and Shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Computer Registers, Computer instructions, Instruction cycle. Instruction codes, Timing and Control, Types of Instructions: Memory Reference Instructions, Input – Output and Interrupt.

Hours-10

Module III

Central Processing Unit organization: General Register Organization, Stack organization, Instruction formats, Addressing modes, Data Transfer and Manipulation, Program Control, CISC and RISC processors

Control unit design: Design approaches, Control memory, Address sequencing, micro program example, design of CU. Micro Programmed Control.

Hours-10

Module IV

Memory Organization: Semiconductor Memory Technologies**,** Memory hierarchy, Interleaving, Main Memory-RAM and ROM chips, Address map, Associative memory-Hardware organization. Match logic. Cache memory-size vs. block size, Mapping functions-Associate, Direct, Set Associative mapping. Replacement algorithms, write policies. Auxiliary memory- Magnetic tapes etc.

Hours-15

Module V

Input –Output Organization: Peripheral devices, Input-output subsystems, I/O device interface, I/O Processor, I/O transfers–Program controlled, Interrupt driven, and DMA, interrupts and exceptions. I/O device interfaces – SCII, USB

Pipelining and Vector Processing: Basic concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards.

Hours-15

COURSE OUTCOMES:

Upon completion of this course, students should be able to:

CO-1: Student will learn the concepts of computer organization for several engineering applications.

CO-2: Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.

CO-3: An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principle

CO-4: To impart the knowledge on micro programming

CO-5: Comprehend the concepts of advanced pipelining techniques

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2									2
CO2	3	2	3	2								2
CO3	3	2	3									2
CO4	3	2	3	2								2
CO5	2	2	3	2	2						2	2
Avg	2.8	2.0	2.8	2.0							2.0	2.0

TEXT BOOKS:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI
3. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
4. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.

DIGITAL ELECTRONICS & LOGIC DESIGN (BTCSE-304)

Subject Code	BTCSE304	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To study the basic philosophy underlying the various number systems, negative number representation, binary.
- Arithmetic, binary codes and error detecting and correcting binary codes.
- To study the theory of Boolean algebra.
- To study representation of switching functions using Boolean algebra.
- Expressions and their minimization techniques.
- To study the combinational logic design of various logic and switching devices and their realization.
- To study the sequential logic circuits design both in synchronous and Asynchronous modes.
- Logic and switching devices, their minimization techniques and their realizations.
- To study some of the programmable logic devices and their use in realization of switching functions.

Module I

Digital System and Binary Numbers: Number System and its arithmetic, Signed binary numbers, Binary codes, Cyclic codes, Hamming Code, the map method up to five variables, Don't care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method).

Hours-10

Module II

Combinational Logic: Combinational Circuits: Analysis Procedure, Design procedure, Binary adder-subtractor, Decimal adder, Binary multiplier, Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders.

Hours-10

Module III

Sequential Logic and Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.

Hours-15

Module IV

Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.

Hours-15

Module V

Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL& CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA andPAL; CPLD and FPGA.

Hours-10

COURSE OUTCOMES:

Upon completion of this course, students should be able to:

CO-1: Understand various types of number systems and their conversions.

CO-2: Simplify the Boolean expressions and apply the Boolean theorems through logical gates

CO-3: Design and implement variety of logical devices using combinational circuits concepts.

CO-4: Demonstrate and compare the construction of programmable logic devices and different types of ROM

CO-5: Analyze sequential circuits like Registers and Counters using flip-flops.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3									2
CO2	3	2	3	1								2
CO3	3	2	2									2
CO4	3	2	3	2								2
CO5	2	2	3	2	2						2	2
Avg	2.8	2.0	2.8	1.67	2						2.0	2.0

TEXT BOOKS:

1. M. Morris Mano and M. D. Ciletti, “Digital Design”, Pearson Education.
2. David J. Comer, “Digital Logic & State Machine Design”, Oxford University Press.
3. RP Jain, “Modern Digital Electronics”, Tata McGraw Hill Publication.

FORMAL LANGUAGES & AUTOMATA THEORY (BTCSE-305)

Subject Code	BTCSE305	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
- To introduce the fundamental concepts of formal languages, grammars and automata theory
- Classify machines by their power to recognize languages.
- Employ finite state machines to solve problems in computing.
- To understand deterministic and non-deterministic machines.
- To understand the differences between decidability and undecidability.

Module - I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems. Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How a DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Mealy machines.

Hours-10

Module - II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Pumping Lemma for Regular Languages, Statement of the pumping lemma, Applications of the Pumping Lemma.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

Hours-15

Module - III

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

Hours-15

Module - IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating €-Productions. Chomsky Normal form Griebech Normal form.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications. Closure Properties of Context-Free Languages: Closure properties of CFL"s, Decision Properties of CFL's

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine.

Hours-10

Module - V

Types of Turing machine: Turing machines and halting.

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

Hours-10

Course Outcomes:

Upon completion of this course, students should be able to:

CO-1: Able to understand the concept of abstract machines and their power to recognize the languages.

CO-2: Able to employ finite state machines for modeling and solving computing problems.

CO-3: Able to design context free grammars for formal languages.

CO-4: Able to distinguish between decidability and undecidability.

CO-5: Able to gain proficiency with mathematical tools and formal methods.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2									2
CO2	3	2	3	2								2
CO3	3	2	3									2
CO4	3	2	2									2
CO5	2	2	3	2	2						2	2
Avg	2.8	2.0	2.6	2	2						2.0	2.0

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition, PHI.
3. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
5. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.

OBJECT ORIENTED PROGRAMMING USING C++ (BTCSE-306)

Subject Code	**BTCSE306**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course Objectives:

- Introduces Object Oriented Programming concepts using the C++ language.
- Introduces the principles of data abstraction, inheritance and polymorphism;
- Introduces the principles of virtual functions and polymorphism
- Introduces handling formatted I/O and unformatted I/O
- Introduces exception handling

Module - I

Object-Oriented Thinking: Different paradigms for problem solving, need for OOP paradigm, differences between OOP and Procedure oriented programming, Overview of OOP concepts-Abstraction, Encapsulation, Inheritance and Polymorphism.

C++ Basics: Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, References. Flow control statement- if, switch, while, for, do, break, continue, goto statements. Functions - Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions. Dynamic memory allocation and de-allocation operators-new and delete, Preprocessor directives.

Hours-15

Module - II

C++ Classes and Data Abstraction: Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class, Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects, Data abstraction, ADT and information hiding.

Hours-15

Module - III

Inheritance: Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class members, Base and Derived class construction, Destructors, Virtual base class.

Virtual Functions and Polymorphism: Static and Dynamic binding, virtual functions, Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

Hours-15

Module - IV

C++ I/O: I/O using C functions, Stream classes hierarchy, Stream I/O, File streams and String streams, Overloading operators, Error handling during file operations, Formatted I/O.

Hours-10

Module - V

Exception Handling: Benefits of exception handling, Throwing an exception, The try block, Catching an exception, Exception objects, Exception specifications, Stack unwinding, Rethrowing an exception, Catching all exceptions.

Hours-5

Course Outcomes:

CO-1: Creating simple programs using classes and objects in C++.

CO-2: Implement Object Oriented Programming Concepts in C++.

CO-3: Develop applications using stream I/O and file I/O.

CO-4: Implement simple graphical user interfaces.

CO-5: Implement Object Oriented Programs using templates and exceptional handling concepts.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	3	2	2		2							2
CO2	3	2	3		2							2
CO3	3	2	2	1	1							2
CO4	3	2	3		2							2
CO5	2	2	3	2	2						2	2
Avg	2.8	2	2.6	1.5	1.8						2	2.0

TEXT BOOKS:

1. The Complete Reference C++, 4th Edition, Herbert Schildt, Tata McGraw Hill.
2. Problem solving with C++: The Object of Programming, 4th Edition, Walter Savitch, Pearson Education.

4TH SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BT401	Engineering Mathematics – IV	3	1	-	4	30	70	100
BTCSE 402	Microprocessor and	4	-	-	4	30	70	100

	Microcontroller							
BTCSE 403	E-Commerce	4	-	-	4	30	70	100
BTCSE 404	Operating Systems	4	-	-	4	30	70	100
BTCSE 405	Database Management System	4	-	-	4	30	70	100
BTCSE 406	Web Technology	4	-	-	4	30	70	100
	Practical							
BTCSE 407L	DBMS **Lab**	-	-	4	2	15	35	50
BTCSE 408L	Web Technology **Lab**	-	-	4	2	15	35	50
	Total	**23**	**1**	**8**	**28**	**210**	**490**	**700**

ENGINEERING MATHEMATICS – IV (BT-401)

Subject Code	**BT401**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course Objective:

- The knowledge of Mathematics is necessary for a better understanding of almost all the engineering and science subjects.
- Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their engineering degree in different disciplines.
- The statistical methods of studying data samples, hypothesis testing and statistical quality control, control charts and their properties.

Module I: FUNCTIONS OF A COMPLEX VARIABLE

Introduction – Limit and continuity of a complex function – Derivative of f (z) – Analytic functions – Harmonic functions – Applications to flow problems. Complex Integration – Cauchy's theorem – Cauchy's integral formula – Series of complex terms (Statements of Taylor's and Laurent's Series without proof) – Zeros and singularity of an analytic functions – Residues – Calculation of residues – Evaluation of real definite integrals (Integration around the unit circle, Integration around the small semi circle , Indenting the contours having poles on the real axis).

Geometric representation of (z), Some standard transformations ($= z + c, w = cz, w = \frac{1}{z}$,

$w = \frac{az+b}{cz+d}$). **15 Hours**

Module II: FINITE DIFFERENCES & INTERPOLATION

Finite differences – Forward differences – Backward differences – Central differences – Differences of a polynomial – Factorial notation – Other difference operators – To find one or more missing terms – Newton's interpolation formulae – Central difference interpolation formulae – Interpolation with unequal intervals – Lagrange's interpolation formula – Inverse interpolation. **15 Hours**

Module III: NUMERICAL DIFFERENTIATION AND INTEGRATION

Numerical differentiation – Formulae for derivatives – Maxima and minima of a tabulated function – Numerical integration – Newton-Cotes quadrature formula – Trapezoidal rule – Simpson's $\frac{1}{3}^{rd}$ –rule , Simpson's $\frac{3}{8}^{th}$ –rule.

10 Hours

Module IV: Z – TRANSFORMS

Introduction – Definition – Some standard Z-transforms – Linearity property –Damping rule – Some standard results – Shifting U_n to the right, Shifting U_n to the left –Initial value theorem and Final value theorem – Convolution theorem – Convergence of Z-transforms – Two sided Z-transform of U_n – Evaluation of inverse Z- transforms (Power series method, Partial fraction method, Inverse integral method) – solving difference equations.

10 Hours

Module V: SAMPLING THEORY

Introduction – Sampling distribution – Testing a hypothesis – Level of significance – Confidence limits – Test of significance of large samples (Test of significance of single mean, difference of means) – Confidence limits for unknown – Small samples – Students ***t***-distribution – Significance test of a sample mean – Significance test of difference between sample means – Chi-Square (χ^2) Test – Goodness of fit.

10 Hours

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

CO-1: Understand, interpret and use the basic concepts: Analytic function, harmonicfunction, Taylor and Laurent Series, Singularity, Residues and evaluation ofimproper integrals.

CO-2: Familiarize the concepts of Finite Differences and Interpolation techniques.

CO-3: Familiarize the concept of Differentiation and Integration by numerical methods.

CO-4: Understand the characteristics and properties of Z-transforms and its applications.

CO-5: Analyze the Statistical data by using statistical tests and to draw valid inferences about the population parameters.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2								2
CO2	3	2	3	2								2
CO3	3	2	2	2								2
CO4	3	2	3	2								2
CO5	2	2	3	2	2						2	2
Avg	2.8	2	2.8	2	2						2	2

TEXT BOOK:

1. **Dr. B.S. Grewal**, "*Higher Engineering Mathematics*", 43rd edition, Khanna Publishers, New Dehli.

REFERENCE BOOKS:

1. **Dr. N.P. Bali, Dr. Ashok Saxena, Dr. N.Ch. S. Narayana**, "*A Text book on EngineeringMathematics*", Laxmi Publications (P)Ltd., New Delhi.
2. **H. K. Dass**, "*Advanced Engineering Mathematics*", S. Chand and Company Ltd.
3. **Erwin Kreyszig**. "*Advanced Engineering Mathematics*", John Wiley and Sons, New York.

MICROPROCESSOR AND MICROCONTROLLER (BTCSE-402)

Subject Code	**BTCSE-402**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course objectives:

- To understand the basics of microprocessors and microcontrollers architectures and its

functionalities.

- To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.
- To design and develop Microprocessor/ microcontroller based systems for real time applications using low level language like ALP.

Module -I:

8086 Architecture:

Architecture of 8086, Register Organization, Programming Model, Memory Segmentation, Physical Memory Organization, Signal descriptions of 8086- Common Function Signals, Minimum and Maximum mode signals, Timing diagrams.

10 Hours

Module -II:

Instruction Set and Assembly Language Programming of 8086: Addressing modes, Instruction Set, Assembler Directives, Procedures, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

12 Hours

Module -III: I/O Interface:

8255 PPI, Various Modes of Operation and Interfacing to 8086, D/A and A/D Converter, Stepper motor, Interfacing of DMA controller 8257 ,Memory Interfacing to 8086, Interrupt Structure of 8086, Interrupt Vector Table, Interrupt Service Routine. Communication Interface: Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

15 Hours

Module -IV: Introduction to Microcontrollers:

Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs, memory interfacing to 8051

10 Hours

Module -V:

8051 Real Time Control:

Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters. ARM Processor: Fundamentals, Registers, current program status register, pipeline concept.

13 Hours

Course Outcomes:

After going through this course the student will be able to

CO-1: The student will learn the internal organization of popular 8086/8051

microprocessors/microcontrollers.

CO-2: The student will learn how to interface peripherals to microprocessors/microcontrollers.

CO-3: The students will learn the design of microprocessors/microcontrollers-based systems

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	1							2
CO2	3	2	3	1	2							2
CO3	3	2	2	2	2							2
Avg	3	2	2.6	1.6	1.6							2

TEXT BOOKS:

1. D. V. Hall, Microprocessors and Interfacing, TMGH, 2nd Edition 2006.

2. Kenneth. J. Ayala, The 8051 Microcontroller, 3rd Ed., Cengage Learning.

3. ARM System Developer's Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCE BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2nd Edition 2006.
2. The 8051Microcontrollers, Architecture and Programming and Applications -K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, PHI, 2nd Ed.
4. Microcontrollers and Application - Ajay. V. Deshmukh, TMGH, 2005.

E-COMMERCE (BTCSE-403)

Subject Code	**BTCSE-403**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course Objective

- Identify the major categories and trends of e-commerce applications.
- Identify the essential processes of an e-commerce system.
- Identify several factors and web store requirements needed to succeed in e-commerce.
- Discuss the benefits and trade-offs of various e-commerce clicks and bricks alternatives.
- Understand the main technologies behind e-commerce systems and how these technologies interact.
- Discuss the various marketing strategies for an online business.

Module-1

Electronic Commerce Environment and Opportunities: The Electronic Commerce Environment, Electronic Marketplace Technologies. Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward.

15 Hours

Module-2

Approaches to Safe Electronic Commerce: Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks.

10 Hours

Module-3

Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash. Internet/Intranet Security Issues and Solutions : The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption.

10 Hours

Module-4

Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: The Means of Distribution, A model for Message Handling, Email working, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

15 Hours

Module-5

Internet Resources for Commerce: Introduction, Technologies for web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and

Architecture, Searching the Internet.

10 Hours

Course Outcomes:

At the end of this course student will:

CO-1: Understand the framework and anatomy of ecommerce applications and analyze ecommerce consumer, organizational applications

CO-2: Infer mercantile process models from both merchant's and consumer's view point

CO-3: Understand the implementation of Electronic Data Interchange (EDI) in day to day life

CO-4: Study all the aspects of Intra-Organizational electronic commerce including supply chain management

CO-5: Analyze different consumer, information searching methods and resource discovery and information retrieval techniques

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	1						2		2
CO2	2	2	3							2		2
CO3	2	2	2	1						2		2
CO4	3	2	3							2		2
CO5	2	2	3	2	2						2	2
Avg	2.2	1.8	2.6	1.3	2					2	2	2

Text Books:

1. Daniel Minoli, Emma Minoli, Web Commerce Technology Handbook. TATA McGraw-Hill Edition.

Reference Books:

1. Ravi Kalakotar and Andrew B.Whinston, Frontiers of Electronic Commerce. Pearson Education - 1999.
2. Achuyut S.Godbole and Atul Kahate, Web Technologies TCP/IP to Internet Application Architectures. Tata McGraw-Hill Publishing Company Limited.
3. Schneider, Electronic Commerce, Cengage Publications.

OPERATING SYSTEMS (BTCSE-404)

Subject Code	**BTCSE-404**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course Objectives:

- To explain main components of OS and their working
- To familiarize the operations performed by OS as a resource Manager

- To impart various scheduling policies of OS
- To teach the different memory management techniques.

Module-1:

Introduction: Concept of Operating Systems (OS), Generations of OS, Types of OS, OS Services, Interrupt handling and System Calls, Basic architectural concepts of an OS, Concept of Virtual Machine, Resource Manager view, process view and hierarchical view of an OS.

Hours 10

Module-2:

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers,

Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, and Response Time.

Scheduling algorithms: Pre-emptive and non-pre-emptive, FCFS, SJF, RR, Priority.

Hours 15

Module-3:

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed),
Disk Management: Disk structure.
Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK, Disk reliability, Disk formatting, Boot-block, Bad blocks.

Hours 15

Module-4:

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

Hours 10

Module-5:

Process Synchronization and Deadlocks: Definition, Race Condition, Critical Section problem, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Security: The security problem, Virus attacks, Program threats, User authentication.

Hours 10

Course Outcomes:

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

CO-1: Understand the basic concepts related to the operating systems.

CO-2: Analyze the various process scheduling algorithms and process synchronization mechanisms

CO-3: Analyze the various memory management schemes

CO-4: Understand the ways to deal the deadlocks and the basic concepts related to files in the system

CO-5: Analyze the protection and security mechanism

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2								2
CO2	3	2	2	1								2
CO3	3	2	3	2								2
CO4	3	2	2									2
CO5	2	2	3	2	2						2	2
Avg	2.8	2	2.6	1.75	2						2	2

TEXTBOOKS:

1. Abraham Silberchatz, Peter B.Galvin, Greg Gagne, "Operating System Concepts", Eighth edition, John Wiley.

REFERENCE BOOKS:

1. Andrew S Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education

2. William Stallings, "Operating Systems: Internals and Design Principles", Sixth Edition 2009, Pearson Education.

3. D.M. Dhamdhere,"Operating Systems, A Concept based Approach", Third Edition, TMH

4. A.S. Godbole," Operating Systems", Second Edition, TMH.

Subject Code	BTCSE-405	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To Understand the basic concepts and the applications of database systems
- To Master the basics of SQL and construct queries using SQL
- To understand the relational database design principles
- To become familiar with the basic issues of transaction processing and concurrency control
- To become familiar with database storage structures and access techniques

Module I: Data base System Applications, Purpose of Database Systems, View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base Architecture – Storage Manager – the Query Processor Data base design and ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – ER Design Issues – Concept Design – Conceptual Design for University Enterprise. Introduction to the Relational Model – Structure – Database Schema, Keys – Schema Diagrams

Hours-15

Module II: Relational Query Languages, Relational Operations. Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus. Overview of the SQL Query Language – Basic Structure of SQL Queries, Set Operations, Aggregate Functions – GROUPBY – HAVING, Nested Sub queries, Views, Triggers.

Hours-13

Module III: Normalization – Introduction, Non loss decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyce/Codd normal form. Higher Normal Forms - Introduction, Multi-valued dependencies and Fourth normal form, Join dependencies and Fifth normal form

Hours-10

Module IV: Transaction Concept- Transaction State- Implementation of Atomicity and Durability –

Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity. Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

Hours-12

Module V:

File organization:– File organization – various kinds of indexes. Query Processing Measures of query cost - Selection operation – Projection operation, - Join operation – set operation and aggregate operation – Relational Query Optimization – Transacting SQL queries – Estimating the cost – Equivalence Rules.

Hours-10

Course Outcomes:

CO-1: Demonstrate the basic elements of a relational database management system

CO-2: Ability to identify the data models for relevant problems

CO-3: Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data

CO-4: Apply normalization for the development of application software's

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3									2
CO2	3	2	3	1								2
CO3	3	2	2									2
CO4	3	2	3									2
Avg	3.0	2.0	2.75	0.25								2.0

TEXT BOOKS:

1. Data base System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition.(All UNITS except III th)

2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.

REFERENCE BOOKS:

1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education.

2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.

WEB TECHNOLOGY (BTCSE-406)

Subject Code	BTCSE-406	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	55	CREDITS	04

Course Objectives:

- To understand and compare the fundamentals of Web hosting and domain name services.
- To understand various non-browser specific web design principles.
- To understand the need and be able to develop HTML/XHTML and CSS pages with valid structure as well as content.
- To understand and be able to develop JavaScript/jQuery code to access the DOM structure of web document and object properties.
- To develop dynamic web pages with usage of server-side scripting PHP and MySQL.

Module -1
Introduction and Web Design:

Introduction to Internet, WWW and Web 2.0, Web protocols and Web servers, Web Design Principles and Web site structure

Hours-10

Module -2
HTML and CSS:

Basics of HTML, HTML Tags and attributes, Meta tags, Character entities, hyperlink, lists, tables, Images, forms, divs, XHTML

Hours-5

Module -3

Basics of CSS, CSS properties for manipulating texts, background, colors, Gradients, Shadow Effects, borders, margins, paddings, transformations, transitions and animations, etc., CSS box modal and CSS Flex, Positioning systems of CSS, CSS media queries.

Hours-10

Module – 4:
JavaScript and jQuery:

Basics of JavaScript and Client-side scripting language, JavaScript syntaxes for variables, functions, branches and repetitions. JavaScript alert, prompt and confirm. Objects in JavaScript, Access/Manipulate web browser elements using DOM Structure, forms and validations, JavaScript events, Basics of jQuery, jQuery syntaxes, jQuery selectors, events, effects, Access/Manipulate web browser elements using jQuery

Hours-15

Module – 5:
PHP and MySQL:

Introduction to PHP and its syntax, combining PHP and HTML, understanding PHP code blocks like Arrays, Strings, Functions, looping and branching, file handling, processing forms on server side, cookies and sessions.

Introduction to PHP MyAdmin, connection to MySQL server from PHP, execution of MySQL queries from PHP, receiving data from database server and processing it on webserver using PHP.

Hours-15

Course Outcomes:

Upon completion of this course, students will be able to:

CO-1: Create web pages using PHP

CO-2: Identify the difference between the HTML PHP and XML documents.

CO-3: Identify the engineering structural design of XML and parse tree

CO-4: Analyze the difference between and PHP and XML.

CO-5: Understand the concept of JAVA SCRIPTS.

CO-6: Identify the difference between the JSP and Servlet.

CO-7: Design web application using MVC architecture

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	3					2		2
CO2	2	2	2	1	2					1		1
CO3	3	3	3	2	3					2		2
CO4	2	2	2	2	2					2		1
CO5	2	2	2	1	2					2		1
CO6	2	2	3	2	2					2		2
CO7	3	3	3	2	3				2	3	2	2
Avg	2.29	2.29	2.57	1.71	2.43	0.00	0.00	0.00	0.29	2.00	0.29	1.57

Text books:

1. Burdman, Jessica, "Collaborative Web Development" Addison Wesley
2. Xavier, C, " Web Technology and Design" , New Age International
3. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication
4. Bhave, "Programming with Java", Pearson Education
5. Herbert Schieldt, "The Complete Reference:Java", TMH. 6. Hans Bergsten, "Java Server Pages", SPD O'Reilly
6. Ullman, "PHP for the Web: Visual QuickStart Guide", Pearson Education
7. Margaret Levine Young, "The Complete Reference Internet", TM

Reference Books:

1. Ramesh Bangia, "Internet and Web Design" , New Age International
2. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication
3. Deitel, "Java for programmers", Pearson Education
4. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech
5. Joel Sklar , "Principal of web Design" Vikash and Thomas Learning

5TH SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BTCSE 501	Cyber law & Information Security	3	1	-	3	30	70	100
BTCSE 502	Operation Research & Optimization Techniques	3	1	-	4	30	70	100
BTCSE 503	Computer Networks	4	-	-	4	30	70	100
BTCSE 504	Java Programming	4	-	-	4	30	70	100
BTCSE 505	Graphics and Image Processing	3	1	-	4	30	70	100
BTCSE 506	Cloud Computing	4	-	-	3	30	70	100
	Practical							
BTCSE 507L	Java **Lab**	-	-	4	2	15	35	50
BTCSE 508L	Graphics **Lab**	-	-	4	2	15	35	50
	Total	**21**	**3**	**8**	**26**	**210**	**490**	**700**

CYBER LAW & INFORMATION SECURITY (BTCSE-501)

Subject Code	**BTCSE-501**	**IA Marks**	30
Number of Lecture Hours/Week	03	**Term End Exam Marks**	70
Total Number of Lecture Hours	45	**CREDITS**	03

Course Objectives:

- Exhibit knowledge to secure corrupted systems, protect personal data, and secure computer networks in an Organization.
- Practice with an expertise in academics to design and implement security solutions.
- Understand key terms and concepts in Cryptography, Governance and Compliance.
- Develop cyber security strategies and policies
- Understand principles of web security and to guarantee a secure network by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.

Module - 1:

Introduction of Cyber Crime, Challenges of cyber-crime, and Classifications of Cybercrimes: Email Spoofing, Spamming, Internet Time Theft, Salami attack/Salami Technique.

Hours-5

Module -2:

Web jacking, Online Frauds, Software Piracy, Computer Network Intrusions, Password Sniffing, Identity Theft, cyber terrorism, Virtual Crime, Perception of cyber criminals: hackers, insurgents and extremist group etc. Web servers were hacking, session hijacking. **Hours-10**

Module -3:

Cyber Crime and Criminal justice: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cheating, Defamation, Harassment and E-mail Abuse, Other IT Act Offences, Monetary Penalties, jurisdiction and Cyber Crimes, Nature of Criminality, Strategies to tackle Cyber Crime and Trends. **Hours-10**

Module -4:

The Indian Evidence Act of 1872 v. Information Technology Act, 2000: Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages.

Hours-10

Module-5:

Tools and Methods in Cybercrime: Proxy Servers and Anonymizers, Password Cracking, Key loggers and Spyware, virus and worms, Trojan Horses, Backdoors, DoS and DDoS Attacks , Buffer and Overflow, Attack on Wireless Networks, Phishing : Method of Phishing, Phishing Techniques.

Hours-10

Course Outcomes:

CO-1: Make Learner Conversant With The Social And Intellectual Property Issues Emerging From 'Cyberspace.

CO-2: Explore the Legal And Policy Developments In Various Countries To Regulate Cyberspace;

CO-3: Develop The Understanding Of Relationship Between Commerce And Cyberspace.

CO-4: Give Learners In Depth Knowledge Of Information Technology Act And Legal Frame Work Of Right To Privacy, Data Security And Data Protection.

CO-5: Make Study On Various Case Studies On Real Time Crimes.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	2	1				3	3	2	2	2	2	2
CO2	2	2				3	2	2	2	2	2	2
CO3	2	1				2	2	2	2	2	2	2
CO4	2	1				2	3	2	2	2	2	2
CO5	2	2	3	2	2						2	2
Avg	2.0	1.4	3	2	2	2.5	2.5	2	2	2	2	2

TEXT BOOKS:

1. Principles of Cyber crime, Jonathan Clough Cambridge University Press

2. John R. Vacca, Computer Forensics:Computer Crime Scene Investigation, 2nd Edition, Charles River Media, 2005

3. Cyber Law Simplified, VivekSood, Pub: TMH.

4. Cyber Security by Nina Godbole, SunitBelapure Pub: Wiley-India

5. Information Warfare: Corporate attack and defense in digital world, William Hutchinson, Mathew Warren, Elsevier.

6. Cyber Laws and IT Protection, Harish Chander, Pub:PHI.

Reference Books:

1. Vakul Sharma, "Handbook of Cyber Law":Macmillan Publishers India (2002).

2. Dr MajidYar, "Cybercrime and Society": Sage Publications Ltd , 2006.

3. Vakul Sharma, "Information Technology Law & Practice Cyber Law & E Commerce", Universal Law Publishing Co Pvt Ltd (2011)

4. C.SamMcQuade, "Understanding and Managing Cybercrime", Prentice Hall, 2006.

OPERATION RESEARCH & OPTIMIZATION TECHNIQUES (BTCSE-502)

Subject Code	BTCSE-502	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- Enumerate the fundamental knowledge of Linear Programming and Dynamic Programming problems.
- Learn classical optimization techniques and numerical methods of optimization.
- Know the basics of different evolutionary algorithms.
- Explain Integer programming techniques and apply different optimization techniques to solve various models arising from engineering areas.

Module –1:

Operations Research: Origin, Definition and scope. Linear Programming: Formulation and solution of linear programming problems by graphical and simplex methods, Big - M and two-phase methods, Degeneracy, Duality in linear programming.

Hours 15

Module – II:

Transportation Problems: Basic feasible solutions, Optimum solution by stepping stone and modified distribution methods, Unbalanced and degenerate problems, Transhipment problem. Assignment problems: Hungarian method, Unbalanced problem, Case of maximization, Travelling salesman and crew assignment problems. **Hours-15**

Module - III:

Concepts of stochastic processes, Poisson process, Birth-death process, Queuing models: Basic components of a queuing system, Steady-state solution of Markovian queuing models with single and multiple servers (M/M/1, M/M/C, M/M/1/k, M/MC/k) **Hours-15**

Module – IV:

Inventory control models: Economic order quantity (EOQ) model with uniform demand, EOQ when shortages are allowed, EOQ with uniform replenishment, Inventory control with price breaks.

Hours-8

Module -V

Game Theory: Two-person zero sum game, Game with saddle points, the rule of dominance; Algebraic, Graphical and linear programming methods for solving mixed strategy games.

Hours-7

Course Outcomes

Students would be able to:

CO-1: Identify and develop operations research model describing a real-life problem.

CO-2: Understand the mathematical tools that are needed to solve various optimization problems.

CO-3: Solve various linear programming, transportation, assignment, queuing, inventory and game problems related to real life.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1				3	3	2	2	2	2	2
CO2	2	2				3	2	2	2	2	2	2
CO3	2	1				2	2	2	2	2	2	2
Avg	2.0	1.33	0.0	0.0	0.0	2.6	2.3	2	2	2	2	2

Text Books:

1. H.A. Taha, Operation Research-An introduction, Printice Hall of India.

2. P.K. Gupta and D.S. Hira, Operations Research, S. Chand & Co.

3. S.D. Sharma, Operation Research, Kedar Nath Ram Nath Publications.

4. J.K. Sharma, Mathematical Model in Operation Research, Tata McGraw Hill.

COMPUTER NETWORKS (BTCSE-503)

Subject Code	BTCSE-503	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- Study the evolution of computer networks and future direction.
- Study the concepts of computer networks from layered.
- Perspective study the issues open for research in computer networks.

Module -I

Introduction: Uses of Computer Networks, Network Hardware, Reference Models: OSI, TCP/IP, Comparison of OSI & TCP/IP reference models.

Introduction to physical layer: Data and Signals, Transmission impairment, Data rate limits, Performance.

Transmission media: Introduction, Guided Media, Unguided Media

Switching: Introduction, Circuit Switched Networks, Packet Switching

Hours-15

Module -II

The Data Link Layer: Data Link Layer design issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols.

The Medium Access Control sublayer: Multiple Access protocols, Ethernet, Data Link Layer Switching.

Hours-15

Module -III

The Network Layer: Network layer design issues, Routing algorithms : The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Congestion control algorithms, Quality of service, IP Addresses, IPv4,IPv6,Tunneling, Fragmentation.

Hours-15

Module -IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP: Introduction to TCP, Service Model, Protocol, Segment Header, Connection Establishment, Connection Release.

Hours-10

Module -V

The Application layer: Domain Name System (DNS), World Wide Web (WWW), E-mail.

Hours-5

Course Outcomes:

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

CO-1: Understand the terminology and concepts of the OSI reference model and TCP-IP.

CO-2: Describe the functions of Data link layer and its protocols.

CO-3: Classifying the different routing algorithms and IP addressing with network layer

CO-4: Understand connection establishment and services provides by TCP and UDP.

CO-5: Explain the working of DNS and World Wide Web

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1								2
CO2	3	2	3	2								2
CO3	3	2	3									2
CO4	3	2	2									2
CO5	2	2	3	2	2						2	2
Avg	2.8	2	2.6	1.6	2						2	2

TEXT BOOKS:

1. "Computer Networks", Andrew S. Tanenbaum, David J.Wetherall, Pearson, 5th edition, 2010.

2. "Data communications and networking", Behrouz A. Forouzan, TMH, 5th edition, 2012.

REFERENCE BOOKS:

1. "Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1, Douglas E. Comer, 5 th edition, PHI

2. "Computer Networks", 5E, Peterson, Davie, Elsevier.

3. "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications.

4. "Computer Networks and Internets with Internet Applications", Comer.

JAVA PROGRAMMING (BTCSE-504)

Subject Code	BTCSE-504	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To introduce the object oriented programming concepts.
- To understand object oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets and swing controls

Module -I

Java Programming- History of Java, comments, Data types, Variables, Constants, Scope and Lifetime of variables, Operators, Type conversion and casting, Enumerated types, Control flow-block scope, conditional statements, loops, break and continue statements, array, simple java standalone programs, class, object and its methods, constructors and its types , methods, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, exploring string class.

Hours-10

Module – II

Inheritance – Inheritance types, super keyword, preventing inheritance: final classes and methods. Polymorphism – method overloading and overriding, abstract classes and methods. Interfaces- Interfaces Vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface. Packages- Defining, creating and accessing a package0, importing packages.

Hours-10

Module -III

Exception handling- Define Exception, advantages of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, creating own exception sub classes. Multithreading –Define Thread, multithreading, thread life cycle.

Hours-10

Module -IV

Collection Framework in Java – Introduction to java collections, Overview of java collection framework, commonly used collection classes- Array List, Vector, Hash table, Stack, String tokenizer.

Files- Streams- Byte streams, Character streams, Text input/output, Binary input/output, random access file operations, File management using File class.

Connecting to Database – JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results, updating data with JDBC.

Hours-15

Module -V

Applets – Define applets, differences between applets and applications, Life cycle of an applet, passing parameters to applets.

GUI Programming with Java- The AWT class hierarchy, Introduction to Swing, Swing Vs AWT, Hierarchy for Swing components, Overview of some Swing components – Jbutton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management – Layout manager types – border, grid and flow

Event Handling- Events, Event sources, Event classes, Event Listeners, Event sources and Listeners, Delegation event model, Examples: Handling a button click, Handling Mouse events, Adapter classes.

Hours-15

Course Outcomes:

CO-1: Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.

CO-2: Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords

CO-3: Use multithreading concepts to develop inter process communication.

CO-4: Understand the process of graphical user interface design and implementation using AWT or swings.

CO-5: Develop applets that interact abundantly with the client environment and deploy on the server.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2					2		2
CO2	3	2	3	2	2					2		2
CO3	3	2	3	2	2					2		2
CO4	3	2	2	2	2					2		2
CO5	2	2	3	2	2						2	2
Avg	2.8	2	2.6	2	2					2	2	2

TEXT BOOK:

1. Java Fundamentals – A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

2. Core Java: An Integrated Approach – Dr R Nageswara Rao

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program, P.J.Deitel and H.M.Deitel, PHI

2. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.

3. Thinking in Java, Bruce Eckel, PE

4. Programming in Java, S. Malhotra and S. Choudhary, Oxford Universities Press.

COMPUTER GRAPHICS AND IMAGE PROCESSING (BTCSE-505)

Subject Code	BTCSE-505	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- The main objective of this module is to introduce to the students the concepts of computer graphics.
- It starts with an overview of interactive computer graphics, two dimensional system and mapping, then it presents the most important drawing algorithm, two-dimensional & 3-D transformation;
- To study the image enhancement techniques.
- To study image compression procedures.
- To study image segmentation and representation techniques.
- To study image restoration.

Module -1:

Introduction to Computer Graphics: What is Computer Graphics, Computer Graphics Applications, Computer Graphics Hardware and software, Two dimensional Graphics Primitives: Points and Lines, Line drawing algorithms: DDA, Bresenham‟s; Circle drawing algorithms: Using polar coordinates, Bresenham‟s circle drawing, mid point circle drawing algorithm; Filled area algorithms: Scanline: Polygon filling algorithm, boundary filled algorithm.

Hours-10

Module -2:

Two/Three Dimensional Viewing: The 2-D viewing pipeline, windows, viewports, window to view port mapping; Clipping: point, clipping line (algorithms):- 4 bit code algorithm, Sutherland-cohen algorithm, parametric line clipping algorithm (Cyrus Beck).

Polygon clipping algorithm: Sutherland-Hodgeman polygon clipping algorithm. Two dimensional transformations: transformations, translation, scaling, rotation, reflection, composite transformation.

Hours-10

Module -3:

Three-dimensional transformations: Three dimensional graphics concept, Matrix representation of 3-D Transformations, Composition of 3-D transformation.

Viewing in 3D: Projections, types of projections, the mathematics of planner geometric projections, coordinate systems.
Hidden surface removal: Introduction to hidden surface removal. The Z- buffer algorithm, scanline algorithm, area sub-division algorithm.

Hours-15

Module -4:

Representing Curves and Surfaces: Parametric representation of curves: Bezier curves, B-Spline curves. Parametric representation of surfaces; Interpolation method.

Illumination, shading, image manipulation: Illumination models, shading models for polygons, shadows, transparency. What is an image? Filtering, image processing, geometric transformation of images.

Hours-10

Module -5:

Introduction to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation.
Image Transformation & Filtering: Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms.
Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering.

Hours-15

Course Outcomes:

CO-1: Digital Image Fundamentals Element of Visual Perception, A Simple Image Model, Coordinate Conventions, Image Sampling and Quantization,
CO-2: Filtering, Smoothing and frequency domain analysis of an image.
CO-3: Filtering in Frequency Domain: Fourier Transform and the Frequency Domain, Basics of Gaussian Low pass Filters.
CO-4: Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO-5: Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
CO-6: Use of geometric transformations on graphics objects and their application in composite form.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2							2
CO2	3	2	3	2	2							2
CO3	3	2	2		2							2
CO4	3	2	3		2							2
CO5	2	2	2	1	2					2		1
CO6	2	2	3	2	2					2		2
PO Avg	2.6	2	2.5	1.5	2	0.00	0.00	0.00	0.29	2.00	0	1.8

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M.Pauline Baker, Pearson Education

2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

3. Digital Image Processing- Rafeal C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008

4. Digital Image Processing- S Jayaraman, S. Essakkirajan, T. Veerakumar-TMH,2010

REFERENCES:

1. Computer Graphics", second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.

2. Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw hill edition.

3. rocedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.

4. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.

5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

6. Computer Graphics, Steven Harrington, TMH

CLOUD COMPUTING (BTCSE-506)

Subject Code	BTCSE-506	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To understand the concepts of Cloud Computing.
- To learn Taxonomy of Virtualization Techniques.
- To learn Cloud Computing Architecture.
- To acquire knowledge on Aneka Cloud Application Platform.
- To learn Industry Cloud Platforms.

Module - I

Introduction to Cloud: Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model. Characteristics and Benefits, Challenges Ahead, Historical Developments.

Hours-10

Module - II

Cloud Computing Architecture: Cloud Delivery models, The SPI Framework, Cloud Software as a Service (SaaS) , Cloud Platform as a Service(PaaS), Cloud Infrastructure as a Service(IaaS), Cloud deployment models, Public Clouds, Community Clouds, Hybrid Clouds, Alternative Deployment models, Expected benefits.

Hours-15

Module - III

Cloud Computing Software Security fundamentals: Cloud Information Security Objectives, Confidentiality, Integrity, Availability, Cloud Security Services, Relevant Cloud Security Design Principles, Secure Cloud Software Requirements, Secure Development practices, Approaches to Cloud Software Requirement Engineering, Cloud Security Policy Implementation.

Hours-10

Module - IV

Cloud Computing Risk Issues: The CIA Traid, Privacy and Compliance Risks, Threats to Infrastructure, Data and Access Control, Cloud Access Control Issues, Cloud Service Provider Risks. Cloud Computing Security challenges: Security Policy Implementation, Policy Types, and Computer Security Incident Response Team (CSIRT).

Hours-15

Module - V

Cloud Computing Security Architecture: Architectural Considerations, General Issues, Trusted Cloud Computing, Secure Execution environments and Communications, Micro architectures, Identity Management and Access Control, Autonomic Security.

Hours-10

Course Outcomes:

At the end of this course student will:

CO-1: Understand the concept of virtualization and how this has enabled the development of Cloud Computing

CO-2: Know the fundamentals of cloud, cloud Architectures and types of services in cloud

CO-3: Understand scaling, cloud security and disaster management

CO-4: Design different Applications in cloud

CO-5: Explore some important cloud computing driven commercial systems

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	1	2							2
CO3	3	2	2		2							2
CO4	3	2	3		2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2	2.6	1.3	2					2		1.8

Text Books:

1. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi from TMH 2013.

2. George Reese Cloud Application Architectures, First Edition, O‟Reilly Media 2009.

References Books:

1. Cloud Computing and SOA Convergence in Your Enterprise A Step-by-Step Guide by David S. Linthicum from Pearson 2010.

2. Cloud Computing 2nd Edition by Dr. Kumar Saurabh from Wiley India 2012.

3. Cloud Computing – web based Applications that change the way you work and collaborate Online – Micheal Miller.Pearson Education.

6TH SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BTCSE 601	Search Engine Optimization	3	1	-	4	30	70	100
BTCSE 602	Artificial Intelligence	4	-	-	4	30	70	100
BTCSE 603	Python Programming	4	-	-	4	30	70	100
BTCSE 604	Data Mining and Business Intelligence	3	-	-	4	30	70	100
BTCSE 605	**Elective – I**	3	-	-	3	30	70	100
BTCSE 606	**Practical** Summer Training / Industrial Workshop/ Certification	-	-	4	2	50	50	100
BTCSE 607L	SEO **Lab**	-	-	4	2	15	35	50
BTCSE 608L	Python Programming **Lab**	-	-	4	2	15	35	50
		17	**1**	**12**	**25**	**230**	**470**	**700**
	Total							

Elective – I

1. ***Principles of Programming Languages***
2. ***Data Analytics***
3. ***Natural Language Processing***
4. ***Scripting Languages***

SEARCH ENGINE OPTIMIZATION (BTCSE-601)

Subject Code	**BTCSE-601**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course Objectives:

- To understand the technological importance of SEO
- To understand about on page and off page optimization
- To understand about Google Ads

Module – I

Basics for SEO: What is Domain, Basic Knowledge of World Wide Web, Difference between Portal and Search Engines, What are SEO, Black hat techniques, White Hat techniques, and How Search Engine works?

SEO Phases, History Of SEO, How SEO Works, What is Googlebot (Google Crawler), Types Of SEO technique, Keywords, Keyword Planner tools

Hours-10

Module - II

SEO Research & Analysis: Market Research, Keyword Research and Analysis, Keyword opportunity, Competitors Website Analysis, SWOT Analysis of Website, How to Choose Best Keywords, Tools available for Keyword Research. Website Design SEO Guidelines: Content Research, Content Guidelines, Content Optimization, Design & Layout, XML Sitemap / URL List Sitemap.

Hours-10

Module- III

On-page Optimization: The Page Title, Meta Descriptions & Meta Keywords, Headings, Bold Text, Domain Names & Suggestions, Canonical Tag, Meta Tags, Images and Alt Text, Internal Link Building, The Sitemap, Invisible Text, Server and Hosting Check, Robots Meta Tag, Doorway Pages, 301 Redirects, 404 Error, Duplicate content.

Hours-10

Module – IV

Off-page Optimization: Page Rank, Link Popularity, Link Building in Detail, Directory Submission, Social Bookmark Submission, Blog Submission, Articles, Links Exchange, Reciprocal Linking, Posting to Forums, Submission to Search Engine, RSS Feeds Submissions, Press Release Submissions, Forum Link Building, Competitor Link Analysis.

Hours-15

Module-V

Analytics: Google Analytics, Installing Google Analytics, How to Study Google Analytics, Interpreting Bars & Figures, How Google Analytics can Help SEO, Advanced Reporting, Webmaster Central & Bing/Yahoo, Open Site Explorer, Website Analysis using various SEO Tools available.

SEO Tools: Keyword Density Analyzer Tools, Google Tools, Yahoo / Bing Tools, Rich Snippet Text Tools, Comparison Tools, Link Popularity Tools, Search Engines Tools, Site Tools, Miscellaneous Tools.

SEO Reporting: Google analysis, Tracking and Reporting, Reports Submission, Securing Ranks

Social media Reach- Video Creation & Submission, Maintenance- SEO tactics, Google search Engine, Other Suggested tools

Hours-15

Course Outcomes:

CO-1: Hands on experience in using Analytics Tools eg: Google Analytics for report extraction and campaign measurement.

CO-2: Analyze marketing problems and provide solutions based on a critical examination of marketing information.

CO-3: Understand the opportunities for deploying emerging digital marketing media and techniques.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2								2
CO2	3	2	2	1								2
CO3	3	2	3	2								2
Avg	3	2	2.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2

TEXT BOOKS:

1. The Art of SEO (Theory in Practice) - Eric Enge, Stephen Spencer, Jessie Stricchiola, and Rand Fishkin (O'REILLY)

2. Search Engine Optimization All-in-One For Dummies by Bruce Clay

REFERENCES:

1. SEO Step-by-Step by Caimin Jones

Subject Code	BTCSE-602	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To learn the distinction between optimal reasoning Vs. human like reasoning.
- To understand the concepts of state space representation, exhaustive search, heuristic
- Search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Module-1:

INTRODUCTION: Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

Hours-5

Module-2:

PROBLEM SOLVING METHODS

Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

Hours-15

Module-3:

KNOWLEDGE REPRESENTATION

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information

Hours-15

Module-4:

Probabilistic Reasoning: Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First- Order Probability.

Hours-15

Module-5:

APPLICATIONS

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving

Hours-10

Course Outcomes:

CO-1: Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.

CO-2: Learn different knowledge representation techniques.

CO-3: Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.

CO-4: Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	2	2	2							2
CO3	3	2	3	2	2							2
CO4	3	2	3	2	2							2
Avg	3.0	2.0	2.75	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0

TEXT BOOK:

1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn., E. Rich and K. Knight (TMH)

2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.

3. Artificial Intelligence, Shivani Goel, Pearson Education.

4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

PYTHON PROGRAMMING (BTCSE-603)

Subject Code	**BTCSE-604**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

COURSE OBJECTIVES:

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.
- To do input/output with files in Python.

Module I

Introduction: The Programming Cycle for Python, Python IDE, Interacting with Python Programs, Elements of Python, Type Conversion.

Basics: Expressions, Assignment Statement, Arithmetic Operators, Operator Precedence, Boolean Expression.

Hours-10

Module II

Conditionals: Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and Elif statement in Python, Expression Evaluation & Float Representation.

Loops: Purpose and working of loops, While loop including its working, For Loop, Nested Loops, Break and Continue.

Hours-10

Module III

Function: Parts of a Function, Execution of A Function, Keyword and Default Arguments, Scope Rules.

Strings: Length of the string and perform Concatenation and Repeat operations in it. Indexing and Slicing of Strings.

Python Data Structure: Tuples, Unpacking Sequences, Lists, Mutable Sequences, List Comprehension, Sets, Dictionaries Higher Order Functions: Treat functions as first class Objects, Lambda Expressions

Hours-15

Module IV

FILES, EXCEPTIONS

File I/O, Exception Handling, introduction to basic standard libraries, Installation of pip, **Demonstrate Modules:** Turtle, pandas, numpy.

Hours-10

Module V

OOPS

Object, Class, Method, Inheritance, Polymorphism, Data Abstraction, Encapsulation, **Python Frameworks:** Explore django framework with an example

Hours-15

Course Outcomes:

CO-1: To read and write simple Python programs.

CO-2: To develop Python programs with conditionals and loops.

CO-3: To define Python functions and to use Python data structures –- lists, tuples, dictionaries

CO-4: To do input/output with files in Python

CO-5: Learn about libraries and modules

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2							2
CO2	3	2	2	1	2							2
CO3	3	2	3	2	2							2
CO4	3	2	3	2	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2	2.6	1.4	2.0	0.0	0.0	0.0	0.0	2	0.0	1.8

TEXT BOOKS

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist__, 2nd edition, Updated for Python 3, Shroff/O_Reilly Publishers, 2016.

2. R. Nageswara Rao, ―Core Python Programming‖, dreamtech

3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

REFERENCE BOOKS:

1. Core Python Programming, W.Chun, Pearson.

2. Introduction to Python, Kenneth A. Lambert, Cengage

3. Learning Python, Mark Lutz, Orielly

DATA MINING AND BUSINESS INTELLIGENCE (BTCSE-604)

Subject Code	BTCSE-605	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To introduce the concept of data warehouse, data Mining as an important tool for enterprise data management and as a cutting-edge technology for building competitive advantage.
- To enable students to effectively identify sources of data and process it for data mining.
- To make students well versed in all data mining algorithms, methods of evaluation.
- To impart knowledge of tools used for data mining
- To provide knowledge on how to gather and analyze large sets of data to gain useful business understanding.
- To impart skills that can enable students to approach business problems analytically identifying opportunities to derive business value from data.

Module-1:

Overview and concepts Data Warehousing and Business Intelligence:

Why reporting and Analysing data, Raw data to valuable information-Lifecycle of Data - What is Business Intelligence - BI and DW in today's perspective - What is data warehousing - The building Blocks: Defining Features - Data warehouses and data 1marts - Overview of the components - Metadata in the data warehouse - Need for data warehousing - Basic elements of data warehousing - trends in data warehousing.

Hours-10

Module-2:

The Architecture of BI and DW

BI and DW architectures and its types - Relation between BI and DW - OLAP (Online analytical processing) definitions - Difference between OLAP and OLTP - Dimensional analysis - What are cubes? Drill-down and roll-up - slice and dice or rotation - OLAP models - ROLAP versus MOLAP - defining schemas: Stars, snowflakes and fact constellations.

Hours-10

Module-3:

Introduction to Data mining (DM): Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process

Data Pre-processing:

Why to pre-process data? - Data cleaning: Missing Values, Noisy Data - Data Integration and transformation - Data Reduction: Data cube aggregation, Dimensionality reduction - Data Compression - Numerosity Reduction - Data Mining Primitives - Languages and System Architectures: Task relevant data - Kind of Knowledge to be mined - Discretization and Concept Hierarchy.

Hours-15

Module-4:

Concept Description and Association Rule Mining

What is concept description? - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons Association Rule Mining: Market basket analysis - basic concepts - Finding frequent item sets: Apriori algorithm - generating rules – Improved Apriori algorithm – Incremental ARM – Associative Classification – Rule Mining.

Hours-15

Module-5:

Data Mining for Business Intelligence Applications:

Data mining for business Applications like Balanced Scorecard, Fraud Detection, Clickstream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance and CRM etc.,

Data Analytics Life Cycle: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.

Hours-10

Course Outcomes:

CO-1: Demonstrate an understanding of the importance of data warehousing and data mining and the principles of business intelligence.

CO-2: Organize and prepare the data needed for data mining using pre preprocessing techniques. Perform exploratory analysis of the data to be used for mining.

CO-3: Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.

CO-4: Define and apply metrics to measure the performance of various data mining algorithms.

CO-5: Apply BI to solve practical problems: Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	2	2	2							2
CO3	3	2	3	2	2							2
CO4	3	2	3	1	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2	2.6	1.6	2	0.0	0.0	0.0	0.0	2	0.0	1.8

Text books:

1. J. Han, M. Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann

2. M. Kantardzic, "Data mining: Concepts, models, methods and algorithms, John Wiley &Sons Inc.

3. PaulrajPonnian, "Data Warehousing Fundamentals", John Willey.

PRINCIPLES OF PROGRAMMING LANGUAGES (BTCSE-605)-
ELECTIVE-I

Subject Code	**BTCSE-606**	**IA Marks**	30
Number of Lecture Hours/Week	03	**Term End Exam Marks**	70
Total Number of Lecture Hours	50	**CREDITS**	03

Course Objectives:

- Introduce important paradigms of Programming Languages
- To Provide conceptual understanding of high-level language design and implementation
- Topic include programming paradigms; syntax and semantics, data types, Expressions and statements; sub programs and blocks; abstract data types, concurrency; functional and logic programming languages; and scripting languages.

Module-1:

Preliminary Concepts: Reasons for studying concepts of programming languages, programming domains, language evaluation criteria, influences on language design, language categories, language design trade-offs, implementation methods, programming environments, Evolution of Major Programming Languages. Syntax and Semantics: General problem of describing syntax, formal methods of describing syntax, attribute grammars, describing the meanings of programs.

Hours-10

Module-2:

Names, Bindings, and Scopes: Introduction, names, variables, concept of binding, scope, scope and lifetime, referencing environments, named constants

Data types: Introduction, primitive, character, string types, user defined ordinal types, array, associative arrays, record, tuple types, list types, union types, pointer and reference types, type checking, strong typing, type equivalence

Hours-10

Module-3:

Expressions and Statements: Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions, short- circuit evaluation, assignment statements, mixed-mode assignment Control Structures – introduction, selection statements, iterative statements, unconditional branching, guarded commands.

Hours-7

Module-4:

Subprograms: Fundamentals of subprograms, design issues for subprograms, local referencing environments, parameter passing methods, parameters that are subprograms, calling subprograms indirectly, overloaded subprograms, generic subprograms, design issues for functions, user defined overloaded operators, closures, co routines

Implementing subprograms: General semantics of calls and returns, implementing simple subprograms, implementing subprograms with stack-dynamic local variables, nested subprograms, blocks, implementing dynamic scoping

Abstract Data types: The concept of abstraction, introductions to data abstraction, design issues, language examples, parameterized ADT, encapsulation constructs, naming encapsulations

Hours-13

Module-5:

Functional Programming Languages: Introduction, mathematical functions, fundamentals of functional programming language, LISP, support for functional programming in primarily imperative languages, comparison of functional and imperative languages

Logic Programming Language: Introduction, an overview of logic programming, basic elements of prolog, deficiencies of prolog, applications of logic programming.

Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library.

Hours-10

Course Outcomes:

CO-1: Acquire the skills for expressing syntax and semantics informal notation.

CO-2: Identify and apply suitable programing paradigm for a given computing application.

CO-3: Gain knowledge of and able to compare the features of various programming language.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	2	2	2							2
CO3	3	2	3	2	2							2
Avg	3	2	2.6	2	2	0.0	0.0	0.0	0.0	0.0	0.0	2

TEXT BOOKS:

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

2. Programming Language Design Concepts, D. A. Watt, Wiley India Edition.

REFERENCE BOOKS:

1. Programming Languages, A.B. Tucker, R.E. Noonan, TMH.

2. Programming Languages, K. C. Louden and K A Lambert., 3rd edition, Cengage Learning.

3. Programming Language Concepts, C Ghezzi and M Jazayeri, Wiley India.

4. Programming Languages 2nd Edition Ravi Sethi Pearson.

DATA ANALYTICS (BTCSE-605)-ELECTIVE-I

Subject Code	BTCSE-606	IA Marks	30
Number of Lecture Hours/Week	03	Term End Exam Marks	70
Total Number of Lecture Hours	50	CREDITS	03

Course Objectives:

- To explore the fundamental concepts of big data analytics.
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques

Module-1:

Introduction to Data Analytics: Sources and nature of data, classification of data (structured, semi-structured, unstructured), characteristics of data, introduction to Big Data platform, need of data analytics, evolution of analytic scalability, analytic process and tools, analysis vs reporting, modern data analytic tools, applications of data analytics.

Data Analytics Lifecycle: Need, key roles for successful analytic projects, various phases of data analytics lifecycle – discovery, data preparation, model planning, model building, communicating results, operationalization.

Hours-10

Module-2:

Data Analysis: Regression modeling, multivariate analysis, Bayesian modeling, inference and Bayesian networks, support vector and kernel methods,

Analysis of time series: linear systems analysis & nonlinear dynamics, rule induction, **Neural networks:** learning and generalization, competitive learning, principal component analysis and neural networks,

Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, stochastic search methods.

Hours-10s

Module-3:

Mining Data Streams: Introduction to streams concepts, stream data model and architecture, stream computing, sampling data in a stream, filtering streams, counting distinct elements in a stream, estimating moments, counting oneness in a window, decaying window, Real-time Analytics Platform (RTAP) applications, Case studies – real time sentiment analysis, stock market predictions.

Hours-10

Module-4:

Frequent Itemsets and Clustering: Mining frequent itemsets, market based modelling, Apriori algorithm, handling large data sets in main memory, limited pass algorithm, counting frequent itemsets in a stream,

clustering techniques: hierarchical, K-means, clustering high dimensional data, CLIQUE and ProCLUS, frequent pattern based clustering methods, clustering in non-Euclidean space, clustering for streams and parallelism.

Hours-10

Module-5:

Frame Works and Visualization: MapReduce, Hadoop, Pig, Hive, HBase, MapR, Sharding, NoSQL Databases, S3, Hadoop Distributed File Systems, Visualization: visual data analysis techniques, interaction techniques, systems and applications.

Introduction to R - R graphical user interfaces, data import and export, attribute and data types, descriptive statistics, exploratory data analysis, visualization before analysis, analytics for unstructured data.

Hours-10

Course outcomes:

CO-1: Discuss various concepts of data analytics pipeline

CO-2: Apply classification and regression techniques

CO-3: Explain and apply mining techniques on streaming data

CO-4: Compare different clustering and frequent pattern mining algorithms

CO-5: Describe the concept of R programming and implement analytics on Big data using R.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	2	2	2							2
CO3	3	2	3	2	2							2
CO4	3	2	3	1	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2	2.6	1.6	2	0.0	0.0	0.0	0.0	2	0.0	1.8

Text books and References:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer

2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press.

3. John Garrett,Data Analytics for IT Networks : Developing Innovative Use Cases, Pearson Education Curriculum & Evaluation Scheme IT & CSI (V & VI semester) 23

4. Bill Franks, Taming the Big Data Tidal wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & Sons.

5. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley

NATURAL LANGUAGE PROCESSING (BTCSE-605)-
ELECTIVE-I

Subject Code	**BTCSE-606**	**IA Marks**	30
Number of Lecture Hours/Week	03	**Term End Exam Marks**	70
Total Number of Lecture Hours	50	**CREDITS**	03

Course objectives:

- To introduce the fundamentals of Language processing from the algorithmic viewpoint.
- To discuss various issues those, make natural language processing a hard task.
- To discuss some applications of Natural Language Processing (NLP).

Module-1:

INTRODUCTION: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance
WORD LEVEL ANALYSIS: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

Hours-10

Module-2:

SYNTACTIC ANALYSIS: Context Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures.

Hours-10

Module-3:

SEMANTICS AND PRAGMATICS: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

Hours-10

Module-4:

BASIC CONCEPTS of Speech Processing: Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – Acoustics of Speech Production; Review of Digital Signal Processing Concepts; Short-Time Fourier Transform, FilterBank and LPC Methods.

Hours-10

Module-5:

SPEECH-ANALYSIS: Features, Feature Extraction and Pattern Comparison Techniques: Speech Distortion Measures– Mathematical and Perceptual – Log–Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion Using A Warped Frequency Scale, LPC, PLP And MFCC Coefficients, Time Alignment And Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.

SPEECH MODELING: Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-Estimation, Implementation Issues.

Hours-10

Course outcomes:

CO-1: Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.

CO-2: Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.

CO-3: Able to manipulate probabilities, construct statistical models overstrings and trees

CO-4: Will be able to estimate parameters using supervised and unsupervised training methods.

CO-5: Able to design, implement, and analyze NLP algorithms. Able to design different language modeling Techniques.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	2	2	2							2
CO3	3	2	3	2	2							2
CO4	3	2	3	1	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2	2.6	1.6	2	0.0	0.0	0.0	0.0	2	0.0	1.8

Text books:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, OReilly Media, 2009.

3. Lawrence Rabiner And Biing-Hwang Juang, "Fundamentals Of Speech Recognition", Pearson Education, 2003.

4. Daniel Jurafsky And James H Martin, "Speech And Language Processing – An Introduction To Natural Language Processing, Computational Linguistics, And Speech Recognition", Pearson Education, 2002.

5. Frederick Jelinek, "Statistical Methods Of Speech Recognition", MIT Press, 1997.

SCRIPTING LANGUAGES (BTCSE-605)-ELECTIVE-I

Subject Code	**BTCSE-606**	**IA Marks**	30
Number of Lecture Hours/Week	03	**Term End Exam Marks**	70
Total Number of Lecture Hours	45	**CREDITS**	03

Course objectives:

- To study the basics of scripting languages like Java script, Perl, PHP and Ruby
- To understand the requirements of Scripting Languages
- To identify the uses of Scripting Languages
- To introduce in-depth knowledge of programming features of Perl and Angular JS
- To state the implementation and applications of Scripting.

Module-1:

Introduction to Scripts and Scripting Language – Scripts and Programs, Origins of Scripting, Uses for Scripting Languages, Web Scripting.

JavaScript: Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects.

Hours-10

Module-II:

JavaScript programming of reactive web pages elements - Events, Event handlers, Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms. **Introduction to Angular JS** – Development Tools, Basic Program, Angular Modules and Controllers.

Hours-10

Module-III:

Introduction to PERL- Names and Values, Variables and Assignments, Scalar Expressions, Control Structures, Built-in Functions, Collections of Data, Arrays and Lists, Hashes, Strings, Patterns, and Regular Expressions.

Hours-10

Module-IV:

Advanced PERL: Finer points of looping, data structures, Security Issues PHP Basics - Features, Data Types, Variables, Operators, Arrays, Strings, Control structures, Loops, Functions, Date &

Time, File Handling, Form handling.

Hours-10

Module-V:

Ruby – Features, Classes and Objects, Variables, Operators, Comments, If-else, Loops, Methods, Blocks, Modules, Arrays, Strings, Hashes, Date & Time, Ranges, Iterators, File I/O, Exceptions

Hours-5

Course outcomes:

Students will be able to:

CO-1: To differentiate the typical scripting languages and application programming languages.

CO-2: To implement the design of programs for simple applications.

CO-3: To classify the Angular Modules

CO-4: To specify the Controllers used in Angular JS

CO-5: To create software systems using scripting languages such as Perl, PHP, and Ruby

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	2	2	2							2
CO3	3	2	3	2	2							2
CO4	3	2	3	1	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2.0	2.6	1.6	2	0.0	0.0	0.0	0.0	2	0.0	1.8

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.

2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites 3rd Edition, O'Reilly Publications

REFERENCE BOOKS:

1. The Ruby Programming Language, David Flanagan and Yukihiro Matsumoto, O'Reilly Publications

2. AngularJS Programming by Example (Kindle Edition) by Kurniawan, AgusKurniawan

7TH SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BTCSE 701	Software Testing and Quality Assurance	4	-	-	4	30	70	100
BTCSE 702	Parallel Computing	3	1	-	4	30	70	100
BTCSE 703	Machine Learning	4	-	-	4	30	70	100
BTCSE 704	Embedded Systems	4	-	-	4	30	70	100
BTCSE 705	Design and Analysis of Algorithms	4	-	-	4	30	70	100
	Elective – II	3	-	-	3	30	70	100
	Practical							
BTCSE 707L	Software Testing and Quality Assurance **Lab**	-	-	4	2	15	35	50
BTCSE 708L	Machine Learning **Lab**	-	-	4	2	15	35	50
	Total	**22**	**2**	**8**	**28**	**210**	**490**	**700**

1. ***Mobile Computing***
2. ***Soft Computing***
3. ***Cryptography***
4. ***Distributed Databases***

SOFTWARE TESTING AND QUALITY ASSURANCE
(BTCSE-701)

Subject Code	**BTCSE-701**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course Objective:

Develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time

- Student learn systematic approach to the development, operation, maintenance, and retirement of software
- Student learn how to use available resources to develop software, reduce cost of software and how to maintain quality of software
- Methods and tools of testing and maintenance of software's.

Module-1:

Testing as an engineering activity, Role of process in software quality, Testing as a process, Basic definitions, Software testing principles, The tester's role in a software development organization, Origins of defects, Defect classes, The defect repository and test design, Defect examples, Developer / Tester support for developing a defect repository.

Hours-10

Module-2:

Testing techniques and levels of testing:

Using White Box Approach to Test design - Static Testing Vs. Structural Testing, Code Functional Testing, Coverage and Control Flow Graphs, Using Black Box Approaches to Test Case Design, Random Testing, Requirements based testing, Decision tables, State-based testing, Cause-effect graphing, Error guessing, Compatibility testing, Levels of Testing -Unit Testing, Integration Testing, Defect Bash Elimination. System Testing - Usability and Accessibility Testing, Configuration Testing, Compatibility Testing

Hours-15

Module-3:

Software Test Automation, Skills needed for Automation, Scope of Automation, Design and Architecture for Automation, Requirements for a Test Tool, Challenges in Automation Tracking the Bug, Debugging. Testing Software System Security - Six-Sigma, TQM - Complexity Metrics and Models, Quality Management Metrics, Availability Metrics, Defect Removal Effectiveness, FMEA, Quality Function Deployment, Taguchi Quality Loss Function, Cost of Quality.

Hours-10

Module-4:

Quality Assurance tools and Models

SQA basics, Components of the Software Quality Assurance System, software quality in business context, planning for software quality assurance, product quality and process quality, software process models, 7 QC Tools and Modern Tools. Models for Quality Assurance, ISO-9000 series, CMM, CMMI, Test Maturity Models, SPICE, Malcolm Baldrige Model- PCMM

Hours-15

Module-5:

Quality Assurance trends; Software Process- PSP and TSP, OO Methodology, Clean-room software engineering, Defect Injection and prevention, Internal Auditing and Assessments, Inspections & Walkthroughs, Case Tools and their Effect on Software Quality. **Hours-10**

Course Outcomes:

CO-1: Describe fundamental concepts of software quality assurance.
CO-2: Explore test planning and its management.
CO-3: Understand fundamental concepts of software automation.
CO-4: Apply Selenium automation tool for testing web based application.
CO-5: Demonstrate the quality management, assurance, and quality standard to software system.
CO-6: Demonstrate Software Quality Tools and analyze their effectiveness.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	2	2	2							2
CO3	3	2	3	2	2							2
CO4	3	2	3	1	2							2
CO5	2	2	2	1	2					2		1
CO6	2	2	3	2	2					2		2
Avg	2.6	2	2.6	1.6	2	0.0	0.0	0.0	0.0	2	0.0	1.8

Text Book:
Daniel Galin, "Software Quality Assurance", Pearson Publication, 2009.

Reference Books:
1. KshirsagarNaik and PriyadarshiTripathy, Software Testing & Quality Assurance- Theory and Practice, Wiley Studentedition
2. William E. Perry, Effective Methods for Software Testing, WILLEY, 3rdEdition
3. Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press, 1997.
4. M G Limaye, Software Testing, Tata McGraw-Hill Education, 2009

PARALLEL COMPUTING (BTCSE-702)

Subject Code	**BTCSE-702**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course Objectives:

- To understand the concepts Parallel Computers, Data and Temporal Parallelism.
- To learn Structures of Parallel Computers.
- To understand the concepts of Operating Systems for Parallel Computers.

Module-1

Introduction to Parallel Computing:

Scope of Parallel Computing, Implicit Parallelism: Trends in Microprocessor Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks, Impact of Process-Processor Mapping and Mapping Techniques.

Hours-15

Module-2

Principles of Parallel Algorithm Design:

Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models.

Hours-10

Module-3

Basic Communication Operations:

One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to All Personalized Communication, Circular Shift, Improving the Speed of Some Communication Operations.

Hours-10

Module-4

Analytical Modelling of Parallel Programs:

Sources of Overhead in Parallel Programs, Performance Metrics for Parallel Systems, The Effect of Granularity on Performance, Scalability of Parallel Systems, Minimum Execution Time and Minimum Cost-Optimal Execution Time, Asymptotic Analysis of Parallel Programs, Other Scalability Metrics.

Hours-15

Module-5

Programming Using the Message-Passing Paradigm:

Principles of Message-Passing Programming, The Building Blocks: Send and Receive Operations, MPI: the Message Passing Interface, Topologies and Embedding, Overlapping Communication with Computation, Collective Communication and Computation Operations, Groups and Communicators.

Hours-10

Course Outcomes:

Upon completion of this course you will:

CO-1: Gain basic understanding of fundamental concepts in parallel computing.

CO-2: Be able to identify and leverage common parallel computing patterns.

CO-3: Be able to properly assess efficiency and scalability of a parallel algorithm/application.

CO-4: Become proficient in using at least one parallel programming technique, and familiar with several others.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	1	2							2
CO3	3	2	3	2	2							2
CO4	3	2	2	2	2							2
Avg	3.0	2.0	2.75	1.75	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0

Text Books:

1. John L Hennessy, David A Patterson, “Computer Architecture: A Quantitative Approach”, Sixth Edition, Morgan Kaufmann, 2018, ISBN: 978-0-12-811905-1.
2. Kai Hwang, Naresh Jotwani, “Advanced Computer Architecture”, Third Edition, Tata McGraw-Hill Edition, 2016, ISBN: 978-0-07-070210-3.

Reference Books:

1. D. E. Culler, J. P. Singh, and A. Gupta, "Parallel Computer Architecture", Second Edition, Morgan Kaufmann, 2017, ISBN:978-1-4987-7271-6.
2. McCool, Michael D., Arch D. Robison and James Reinders, "Structured Parallel Programming: Patterns for Efficient Computation", Morgan Kaufmann, 2012, ISBN: 9780-12-415993-8.

MACHINE L E A R N I N G (BTCSE-703)

Subject Code	BTCSE-703	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To understand the need, concepts and applications of machine learning.
- Develop the ability to understand and apply data analysis on real world data
- Provide an overview of Machine Learning

Module-1:

INTRODUCTION:

Machine learning applications – Basic definitions- types of learning: unsupervised learning- Reinforcement Learning – Supervised Learning – Learning a class from examples – hypothesis space and inductive bias- Vapnik-Chervonenkis (VC) Di- mension – Probably Approximately Correct (PAC) Learning – Noise – Learning multiple classes – Model selection and Generalization- Evaluation and Cross validation.

Hours-15

Module-2:

LINEAR REGRESSION:

Introduction to decision trees - Learning decision trees- Issues-Pruning Overfitting - k-Nearest neighbour-Feature selection: Metrics-Feature Reduction: Dimensionality reduction – Subset selection – Principal component analysis – Factor analysis – Multidimensional scaling – Linear discriminant analysis.

Hours-15

Module-3:

BAYESIAN LEARNING:

Bayes theorem-Maximum Likelihood-Bayes optimal classifier- Gibbs Algorithm-Naive Bayes Classifier- Bayesian Belief networks-Clustering: Mixture Densities – K Means Clustering – Expectation Maximization – Hierarchical clustering.

Hours-8

Module-4:

LINEAR DISCRIMINATION:

Linear Discrimination – Linear Model – Geometry of the Linear Discriminant – Pairwise Separation – Gradient Descent – Logistic Discrimination – Discrimination by Regression – Multilayer Perceptrons: Introduction – Perceptron– Training a Perceptron – Learning Boolean Functions – Multilayer Perceptrons – Back- propagation Algorithm.

Hours-15

Module-5:

KERNEL MACHINES:
SVM-Optimal Separating Hyperplane – kernel trick –Hidden Markov Models – Evaluation-Model selection –Introduction to Ensembles- Bagging – Boosting.

Hours-7

Course Outcomes:

CO-1: Evaluate machine learning theory in problem solving

CO-2: Understand dimension reduction techniques

CO-3: Understand Bayesian classifications

CO-4: Learn MLP and Back Propagation.

CO-5: Understand ensemble learning models

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	1	2							2
CO3	3	2	2	1	2							2
CO4	3	2	3	2	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2	2.6	1.4	2.0	0.0	0.0	0.0	0.0	2	0.0	1.8

Text Books:

1. Ethem Alpaydin,"Introduction to Machine Learning", 3^{rd} Edition, PHI, 2014.
2. Tom M. Mitchell, Machine Learning, Mc Graw Hill, 2003.
3. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
4. Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
5. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

References book:

1. David Brown," Artificial Intelligence", Kindle Edition, 17 Books Ltd., 2020.

EMBEDDED SYSTEMS (BTCSE-704)

Subject Code	**BTCSE-704**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

COURSE OBJECTIVES:

For embedded systems, the course will enable the students to:

- Understand the basics of an embedded system.
- Understand the typical components of an embedded system.
- To understand different communication interfaces.
- To learn the design process of embedded system applications.
- To understands the RTOS and inter-process communication.

Module I:

Basics of computer architecture and the binary number system Basics of computer architecture, computer languages, RISC and CISC architectures, number systems, number format conversions, computer arithmetic, units of memory capacity

Hours-15

Module II:

Introduction to embedded systems Application domain of embedded systems, desirable features and general characteristics of embedded systems, model of an embedded system, microprocessor Vs microcontroller, example of a simple embedded system, figure of merit for an embedded system, classification of MCUs: 4/8/16/32 bits, history of embedded systems, current trends

Hours-15

Module III:

Embedded systems-The hardware point of view Microcontroller unit (MCU), a popular 8-bit MCU, memory for embedded systems, low power design, pull up and pull down resistors

Hours-10

Module IV:

Sensors, ADCs and Actuators Sensors: Temperature Sensor, Light Sensor, Proximity/range Sensor; Analog to digital converters: ADC Interfacing; Actuators Displays, Motors, Opto couplers/Opto isolators, relays.

Hours-10

Module V:

Examples of embedded systems Mobile phone, automotive electronics, radio frequency identification (RFID), wireless sensor networks (WISENET), robotics, biomedical applications, brain machine interface

Hours-10

Course Outcomes:

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

CO-1: Learn about the general principles of computer architecture

CO-2: Learn about the working of a simple embedded system and embedded system applications

CO-3: Learn the hardware aspects of embedded systems

CO-4: Understand the sensors, ADCs and actuators used in embedded systems

CO-5: Understand the real world examples of embedded systems

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	1	2							2
CO3	3	2	2	1	2							2
CO4	3	2	3	2	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2	2.6	1.4	2	0.0	0.0	0.0	0.0	2	0.0	1.8

Text Books:

Lyla B Das, Embedded systems: An Integrated Approach, 1st Ed., Pearson, 2013

Reference Books:

1. Shibu, K.V., Introduction to Embedded Systems, 1st Ed., TMH, 2009
2. Kanta Rao B, Embedded Systems, 1st Ed., PHI
3. Frank Vahid & Tony Givargis, Embedded System Design, 2nd Edition, John Wiley,

DESIGN AND ANALYSIS OF ALGORITHMS (BTCSE-705)

Subject Code	**BTCSE-705**	**IA Marks**	30
Number of Lecture Hours/Week	04	**Term End Exam Marks**	70
Total Number of Lecture Hours	60	**CREDITS**	04

Course Objectives:

- To analyze performance of algorithms.
- To understand and choose the appropriate algorithm design technique for a specified application.
- To solve problems using algorithm design techniques such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
- To analyze the impact of algorithm design techniques on each application solved.
- To introduce and understand P and NP classes

Module-1:

INTRODUCTION:

Algorithm, pseudo code for expressing algorithms, performance analysis-space complexity, time complexity, asymptotic notation- big (O) notation, omega notation, theta notation and little (o) notation, recurrences, probabilistic analysis, disjoint set operations, union and find algorithms.

Hours-10

Module -II:

DIVIDE AND CONQUER:

General method, applications-analysis of binary search, quick sort, merge sort, AND OR Graphs. **GREEDY METHOD:** General method, Applications-job sequencing with deadlines, Fractional knapsack problem, minimum cost spanning trees, Single source shortest path problem.

Hours-10

Module – III:

GRAPHS (Algorithm and Analysis): Breadth first search and traversal, Depth first search and traversal, Spanning trees, connected components and bi-connected components, Articulation points.

DYNAMIC PROGRAMMING: General method, applications - optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

Hours-15

Module - IV

BACKTRACKING:
General method, Applications- n-queen problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles.

BRANCH AND BOUND: General method, applications - travelling sales person problem, 0/1 knapsack problem- LC branch and bound solution, FIFO branch and bound solution.

Hours-15

Module – V:

NP-HARD AND NP-COMPLETE PROBLEMS:
Basic concepts, non-deterministic algorithms, NP-hard and NP-complete classes, Cook‘s theorem.

Hours-10

Course Outcomes:
At the end of this course students will be able to

CO-1: Identify various Time and Space complexities of various algorithms.

CO-2: Understand Tree Traversal method and Greedy Algorithms.

CO-3: Apply Dynamic Programming concept to solve various problems.

CO-4: Apply Backtracking, Branch and Bound concept to solve various problems

CO-5: Implement different performance analysis methods for non-deterministic algorithms.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	1	2							2
CO3	3	2	2	1	2							2
CO4	3	2	3	2	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2	2.6	1.4	2	0.0	0.0	0.0	0.0	2	0.0	1.8

TEXT BOOKS:

1. Ellis Horowitz, Satraj Sahni, Rajasekharam (2007), Fundamentals of Computer Algorithms, 2nd edition, University Press, New Delhi.

REFERENCE BOOKS:

1. R. C. T. Lee, S. S. Tseng, R.C. Chang and T. Tsai (2006), Introduction to Design and Analysis of Algorithms A strategic approach, McGraw Hill, India.

2. Allen Weiss (2009), Data structures and Algorithm Analysis in C++, 2nd edition, Pearson education, New Delhi.

3. Aho, Ullman, Hopcroft (2009), Design and Analysis of algorithms, 2nd edition, Pearson education, New Delhi

MOBILE COMPUTING (BTCSE-706)-ELECTIVE-II

Subject Code	BTCSE-706	IA Marks	30
Number of Lecture Hours/Week	03	Term End Exam Marks	70
Total Number of Lecture Hours	45	CREDITS	03

Course Objectives:

- Should have studied papers such as Communication systems, Data communications and networking and wireless networks.
- To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture. To have an exposure about wireless protocols –Wireless LAN, Bluetooth, WAP, Zig Bee issues.
- To Know the Network, Transport Functionalities of Mobile communication.
- To understand the concepts of Adhoc and wireless sensor networks.
- Introduce Mobile Application Development environment.

Module-I:

WIRELESS COMMUNICATION FUNDAMENTALS

Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA –TDMA – CDMA – Cellular Wireless Networks.

Hours-10

Module-II:

TELECOMMUNICATION NETWORKS & WIRLESS LAN

Telecommunication systems – GSM – GPRS - Satellite Networks ,Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a -802.11b standards – HIPERLAN – Blue Tooth.

Hours-10

Module-III:

MOBILE NETWORK LAYER & TRANSPORT LAYER

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics. Traditional TCP, Mobile TCP

Hours-8

Module-IV:

APPLICATION LAYER

WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WML Scripts

Hours-7

Module-V:

DATABASE ISSUES

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

Hours-10

Course Outcomes:

After completion of this course, student will be able

CO-1: To understand concepts of Mobile Communication.

CO-2: To analysenext generation Mobile Communication System.

CO-3: To understand network and transport layers of Mobile Communication.

CO-4: Analyze various protocols of all layers for mobile and ad hoc wireless communication networks.

CO-5: To understand IP and TCP layers of Mobile Communication.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	1	2							2
CO3	3	2	2	1	2							2
CO4	3	2	3	2	2							2
Avg	3.0	2.0	2.75	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0

Text Books:

1. J. Schiller, ―Mobile Communications‖, 2nd edition, Pearson, 2011.
2. Raj Kamal ―Mobile Computing‖ Oxford Higher Education, Second Edition, 2012.
3. Dharam prakash Agrawal and Qing-An Zeng, ―Introduction to Wireless and Mobile Systems‖ 3rd edition, Cengage learning 2013.

Reference Books:

1. Asoke K Talukder, Hasan Ahmed,Roopa R Yavagal ―Mobile Computing‖, Tata McGraw Hill Pub ,Aug – 2010
2. Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farrell ―Wireless Networking Complete‖ Morgan Kaufmann Series in Networking , 2009 (introduction, WLAN MAC)
3. Vijay K Garg ―Wireless Communications & Networking‖ Morgan Kaufmann Series, 2010
4. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
5. Charles Perkins, Mobile IP, Addison Wesley.
6. Charles Perkins, Ad hoc Networks, Addison Wesley.
7. Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober, ―Principles of Mobile Computing‖, Springer.

SOFT COMPUTING (BTCSE-706)-ELECTIVE-II

Subject Code	BTCSE-706	IA Marks	30
Number of Lecture Hours/Week	03	Term End Exam Marks	70
Total Number of Lecture Hours	45	CREDITS	03

Course Objectives:

- Familiarize with soft computing concepts
- Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
- Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
- Learn the concepts of Genetic algorithm and its applications
- Acquire the knowledge of Rough Sets.

Module-I:

Introduction to Soft Computing:

Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

Hours-10

Module-II:

Fuzzy Systems:

Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

Hours-10

Module-III:

Fuzzy Expert Systems, Fuzzy Decision Making, Particle Swarm Optimization **Hours-5**

Module-IV:

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

Hours-10

Module-V:

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

Hours-10

Course Outcomes:

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

CO-1: Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.

CO-2: Understand fuzzy logic and reasoning to handle and solve engineering problems

CO-3: Apply the Classification and clustering techniques on various applications.

CO-4: Understand the advanced neural networks and its applications

CO-5: Perform various operations of genetic algorithms, Rough Sets.

CO-6: Comprehend various techniques to build model for various applications

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	1	2							2
CO3	3	2	2	1	2							2
CO4	3	2	3	2	2							2
CO5	2	2	2	1	2					2		1
CO6	2	2	3	2	2					2		2
Avg	2.6	2	2.6	1.5	2.0	0.0	0.0	0.0	0.0	2	0.0	1.8

Text Books:

1. S.Rajasekaran, G.A. Vijayalakshmi Pai, Neural Networks, fuzzy logic, and genetic algorithms - Genetic Algorithm, PHI Learning Private Limited- 2010.

2. S.N.Sivanandam, S.N.Deepa Wiley India, Principles of SOFT COMPUTING, Second Edition 2011.

References Books:

1. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

2. Siman Haykin,"Neural Netowrks"Prentice Hall of India.

3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill

CRYPTOGRAPHY (BTCSE-706)-ELECTIVE-II

Subject Code	BTCSE-706	IA Marks	30
Number of Lecture Hours/Week	03	Term End Exam Marks	70
Total Number of Lecture Hours	50	CREDITS	03

Course Objectives:

- To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
- To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
- To familiarize Digital Signature Standard and provide solutions for their issues.
- To familiarize with cryptographic techniques for secure (confidential) communication of two parties over an insecure (public) channel; verification of the authenticity of the source of a message.

Module-I:

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

Hours-10

Module-II:

Symmetric key Ciphers:

Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4. Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

Hours-10

Module-III:

Cryptographic Hash Functions:

Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

Hours-10

Module-IV:

Transport-level Security:

Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH) Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

Hours-10

Module - V

E-Mail Security:

Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, Internet Key Exchange **Hours-10**

Course Outcomes:

After successful completion of the course, the learners would be able to

CO-1: Provide security of the data over the network.

CO-2: Do research in the emerging areas of cryptography and network security.

CO-3: Implement various networking protocols.

CO-4: Protect any network from the threats in the world.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	1	2							2
CO3	3	2	2	1	2							2
CO4	3	2	3	2	2							2
Avg	3.0	2.0	2.75	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0

Text Books:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press.
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

Reference Books:

1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford.
2. Network Security & Cryptography, Bernard Menezes, Cengage, 2010.

DISTRIBUTED DATABASES (BTCSE-706)-ELECTIVE-II

Subject Code	BTCSE-706	IA Marks	30
Number of Lecture Hours/Week	03	Term End Exam Marks	70
Total Number of Lecture Hours	45	CREDITS	03

Course Objectives:

The educational Objectives of this Course are:

- To introduce various Distributed Database Applications in real world scenario
- To be learning more about various Distributed Database Techniques
- Applying efficient Advanced Techniques to solve engineering problems

Module-I:

Transaction and schedules, Concurrent Execution of transaction, Conflict and View Serializability, Testing for Serializability, Concepts in Recoverable and Cascade less schedules.

Hours-7

Module–II:

Lock based protocols, time stamp-based protocols, Multiple Granularity and Multi version Techniques, enforcing serializability by Locks, Locking system with multiple lock modes, architecture for Locking scheduler

Hours-8

Module-III:

Distributed Transactions Management, Data Distribution, Fragmentation and Replication Techniques, Distributed Commit, Distributed Locking schemes, Long duration transactions, Moss Concurrency protocol.

Hours-10

Module–IV:

Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Log based recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems, Checkpoints, Algorithms for recovery line, Concepts in Orphan and Inconsistent Messages.

Hours-10

Module-V:

Distributed Query Processing, Multiday Joins, Semi joins, Cost based query optimization for distributed database, Updating replicated data, protocols for Distributed Deadlock Detection, Eager and Lazy Replication Techniques

Hours-10

Course Outcomes:

CO-1: Analyze database with distributed database concepts and its structures.

CO-2: Apply methods and techniques for Distributed query processing and Optimization

CO-3: Apply the concepts of Distributed Transaction process and concurrency control.

CO-4: Illustrate reliability and providing security in the distributed databases

CO-5: Summarize the concepts of Distributed Object Database Management Systems

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	2	2							2
CO3	3	2	2	2	2							2
CO4	3	2	3	1	2							2
CO5	2	2	2	1	2					2		1
Avg	2.8	2.0	2.6	1.6	2	0.0	0.0	0.0	0.0	2	0.0	1.8

Text Books:

1. M. Tamer Ozsu and Patrick Valduriez, "Principles of Distributed Database Systems", Fourth Edition, Springer, 2020.

Reference Books:

1. Stefano Ceri and Giuseppe Pelagatti, Distributed Databases: Principles and Systems, McGraw Hill Education, 2017.
2. Saeed K. Rahimi and Frank S. Haug, Distributed Database Management Systems: A Practical Approach, Wiley.
3. Chhanda Ray, Distributed Database Systems, First Edition, Pearson Education India.
4. Sachin Deshpande, Distributed Databases, Dreamtech Press.
5. David Bell and Jane Grimson, Distributed Database Systems, First Edition, Addison- Wesley, 1992.
6. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: Database Systems: The Complete Book, Second Edition, Pearson Education.

8TH SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	TE	TM
BTCSE 801	Engineering Economics and Management	4	-	-	3	30	70	100
BTCSE 802	Compiler Design	4	-	-	4	30	70	100
BTCSE 803	ASP.NET	4	-	-	4	30	70	100
BTCSE 804	Ethical Hacking and Prevention	3	1	-	4	30	70	100
BTCSE 805	Final Project Viva voce	-	-	-	8	100	100	200
	Practical							
BTCSE 806L	Asp.Net **Lab**	-	-	4	2	15	35	50
BTCSE 807L	Ethical hacking **Lab**	-	-	4	2	15	35	50
	Total	**15**	**1**	**8**	**27**	**250**	**450**	**700**

ENGINEERING ECONOMICS AND MANAGEMENT (BTCSE-801)

Subject Code	**BTCSE-801**	**IA Marks**	30
Number of Lecture Hours/Week	03	**Term End Exam Marks**	70
Total Number of Lecture Hours	45	**CREDITS**	03

Course Objective:

- The objective of the course is to provide basic understanding of economics and management to engineering students with following aspects:
- To impart knowledge, with respect to concepts, principles and practical applications of economics which govern the functioning of a firm/organization.
- To help the students to understand the fundamental concepts and principles of management; the basic roles, skills, functions of management and basic knowledge of various functional areas.

Module-I:

Fundamentals of Economics:

Wealth, Welfare and Scarce Definitions of Economics; Micro and Macro Economics; Demand- Law of Demand, Elasticity of Demand, Types of Elasticity and Factors determining price elasticity of Demand: Utility- Law of Diminishing Marginal Utility, its limitations and exceptions.

Hours-10

Module-II:

Forms of Business Organizations:

Features, merits and demerits of Sole Proprietorship, Partnership and Joint Stock Company- Public Enterprises and their types.

Hours-10

Module-III:

Introduction to Management:

Functions of Management- Taylor's Scientific Management; Henry Fayol's Principles of Management; Human Resource Management –Basic functions of Human Resource Management (in brief). Production Management: Production Planning and Control, Plant Location, Break-Even Analysis- Assumptions, limitations and applications.

Hours-10

Module-IV:

Financial Management:

Types of Capital: Fixed and Working Capital and Methods of Raising Finance; Final Accounts- Trading Account, Statement of Profit and Loss and Balance Sheet (simple problems)

Hours-7

Module-V:

Marketing Management and Entrepreneurship:

Marketing Management: Functions of marketing and Distribution Channels.

Entrepreneurship: Definition, Characteristics and Functions of an Entrepreneur

Hours-8

Course outcomes:

On completion of this subject students will be able to

CO-1: Understand needs, functions, roles, scope and evolution of Management

CO-2: Understand importance, purpose of Planning and hierarchy of planning and also analyze its types

CO-3: Discuss Decision making, Organizing, Staffing, Directing and Controlling

CO-4: Select the best economic model from various available alternatives

CO-5: Understand various interest rate methods and implement the suitable one.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	2	2	2	3	3	2	3
CO2	3	2	3	2	2	2	2	2	3	3	2	3
CO3	3	2	3	2	2	2	2	2	3	3	2	3
CO4	3	2	3	2	2	2	2	2	3	3	2	3
CO5	3	2	3	2	2	2	2	2	3	3	2	3
Avg	3.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0

TEXT BOOKS:

1.A.R. AryaSri, Managerial Economics and Financial Analysis, TMH Publications, new Delhi, 2014

2. S.C. Sharma and Banga T. R., Industrial Organization & Engineering Economics, khanna Publications, Delhi-6, 2006

3. S.N.Maheswari, SK Maheswari, Financial Accounting Fifth Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2012

COMPILER DESIGN (BTCSE-802)

Subject Code	BTCSE-802	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course objectives:

- To teach concepts of language translation and phases of compiler design
- To describe the common forms of parsers
- To inculcate knowledge of parser by parsing LL parser and LR parser
- To demonstrate intermediate code using technique of syntax directed translation
- To Illustrate the various optimization techniques for designing various optimizing compilers

Module-1:

Overview of language processing: – preprocessors – compiler – assembler – Linkers & loaders, difference between compiler and interpreter- structure of a compiler –phases of a compiler.

Lexical Analysis: - Role of Lexical Analysis – Input Buffering – Specification of Tokens – Recognition of Token – The Lexical Analyzer Generator Lex.

Hours-15

Module-2:

Syntax Analysis: – Role of a parser – Context Free Grammar – Top Down Parsing – Recursive Descent Parsing — Non recursive Predictive Parsing- FIRST and FOLLOW – LL(1) Grammar – Error Recovery in Predictive Parsing.

Hours-15

Module-3:

Bottom up Parsing: – Reductions – Handle Pruning - Shift Reduce Parsing - Introduction to simple LR – Why LR Parsers – Model of an LR Parsers — Construction of SLR Tables.

More powerful LR parsers: - Construction of CLR (1) - LALR Parsing tables.

Hours-10

Module-4:

Runtime Environment: - Storage organization - Stack allocation – Static allocation - Heap management - Parameter passing mechanisms.

Intermediate code: - DAG - Three address code – Quadruples - Triples - Indirect Triples.

Hours-10

Module-5:

Basic Blocks: – DAG representation of Block. Machine independent code optimization - Common sub expression elimination - Constant folding - Copy propagation -Dead code elimination - Strength reduction - Loop optimization.

Machine dependent code optimization: - Peephole optimization – Register allocation - Instruction scheduling - Inter Procedural Optimization - Garbage collection via reference counting.

Hours-10

Course Outcomes:

At the end of this course student will:

CO-1: Understand about language processors and its phases.

CO-2: Demonstrate about scanning of tokens and perform the syntax analysis by using parsing techniques

CO-3: Perform Symantec analysis using attribute grammar and compare different memory management techniques in runtime environment

CO-4: Ascertain optimization techniques for intermediate code forms and code generation

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	2	2	2	3	3	2	3
CO2	3	2	3	2	2	2	2	2	3	3	2	3
CO3	3	2	3	2	2	2	2	2	3	3	2	3
CO4	3	2	3	2	2	2	2	2	3	3	2	3
Avg	3.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0

Text Books:

1. Compilers: Principles, Techniques and Tools: 2nd Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ulman; 2nd Edition, Pearson Education.

2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press

Reference Books:

1. lex &yacc – John R. Levine, Tony Mason, Doug Brown, O‟reilly

2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley reamtech.

3. Engineering a Compiler-Cooper & Linda, Elsevier.

4. Compiler Construction, Louden, Thomson.

5. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011.

ASP.NET (BTCSE-803)

Subject Code	BTCSE-803	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objective:

The student would be able

- To get the practical knowledge of ASP.NET
- To develop website using visual studio web development environment.
- To know the framework architecture of .NET
- To work with disconnected architecture of ADO.NET and can store and retrieve data easily from database.

Module-1:

Introduction .NET framework, features of .Net framework, architecture and component of .Net, elements of .Net.

Hours-10

Module-2:

Basic Features Of C# Fundamentals, Classes and Objects, Inheritance and Polymorphism, Operator Overloading, Structures. Advanced Features of C# Interfaces, Arrays, Indexers and Collections; Strings and Regular Expressions, Handling Exceptions, Delegates and Events.

Hours-15

Module-3:

Installing ASP.NET framework, overview of the ASP .net framework, overview of CLR, class library, overview of ASP.net control, understanding HTML controls, study of standard controls, validations controls, rich controls. Windows Forms: All about windows form, MDI form, creating windows applications, adding controls to forms, handling Events, and using various Tolls

Hours-15

Module-4:

Understanding and handling controls events, ADO.NET- Component object model, ODBC, OLEDB, and SQL connected mode, disconnected mode, dataset, data-reader Data base controls: Overview of data access data control, using grid view controls, using details view and frame view controls, ado .net data readers, SQL data source control, object data source control, site map data source.

Hours-10

Module-5:

XML: Introducing XML, Structure, and syntax of XML, document type definition (DTD), XML Schema, Document object model, Presenting and Handling XML. xml data source, using navigation controls, introduction of web parts, using java script, Web Services

Hours-10

Course Outcome:

Upon completion of the course, the students will be able to:

CO-1: Write various applications using C# Language in the .NET Framework.

CO-2: Develop distributed applications using .NET Framework.

CO-3: Create mobile applications using .NET compact Framework.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	2	2	2	3	3	2	3
CO2	3	2	3	2	2	2	2	2	3	3	2	3
CO3	3	2	3	2	2	2	2	2	3	3	2	3
Avg	3.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0

Text Books:

1. Professional ASP.NET 4.5 in C# and VB, Wrox Publication, Jason N. Gaylord, Christian Wenz, Pranav Rastogi, Todd Miranda, Scott Hanselman, Scott Hunter
2. Pro ASP.NET 4.5 in C#, Apress Publication, Freeman, Adam, MacDonald, Matthew, Szpuszta, Mario
3. ASP.NET: The Complete Reference, McGraw-Hil, Matthew MacDonald
4. Programming Microsoft® LINQ in Microsoft .NET Framework 4 - Marco Russo and Paolo Pialorsi
5. Xamarin Mobile Application Development: Cross-Platform C# and Xamarin.Forms - by Dan Hermes
6. Pro ASP.NET MVC 5 Platform - by Adam Freeman

References:

1. Ian Gariffiths, Mathew Adams, Jesse Liberty, Programming C# 4.00, OReilly, Fourth Edition, 2010.
2. Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Apress publication, 2012.
3. Andy Wigley, Daniel Moth, Peter Foot, Mobile Development Handbook0, Microsoft Press, 2011.

ETHICAL HACKING AND PREVENTION (BTCSE-804)

Subject Code	BTCSE-804	IA Marks	30
Number of Lecture Hours/Week	04	Term End Exam Marks	70
Total Number of Lecture Hours	60	CREDITS	04

Course Objectives:

- To understand the fundamentals of Computer Networks.
- To understand the fundamentals of Cryptography.
- To understand various symmetric and asymmetric encryption algorithms.
- To understand Mathematics of cryptography, IDS and Firewalls.
- To apply algorithms used for message integrity and authentication.

Module-I:

Ethical Hacking: Introduction, Networking & Basics, Foot Printing, Google Hacking, Scanning, Windows Hacking, Linux Hacking, Trojans & Backdoors, Virus & Worms.

Hours-10

Module-II:

Proxy & Packet Filtering, Denial of Service, Sniffer, Social Engineering System and Network Vulnerability and Threats to Security , Various types of attack and the various types of attackers in the context of the vulnerabilities associated with computer and information systems and networks Physical Security, Steganography.

Hours-10

Module-III:

Cryptography, Wireless Hacking, Firewall & Honeypots, IDS & IPS, Vulnerability, Penetration Testing, Session Hijacking, Hacking Web Servers, SQL Injection, Cross Site Scripting, Exploit Writing, Buffer Overflow.

Hours-10

Module-IV:

Reverse Engineering, Email Hacking, Incident Handling & Response, Bluetooth Hacking, Mobile Phone Hacking Basic ethical hacking tools and usage of these tools in a professional environment. Legal, professional and ethical issues likely to face the domain of ethical hacking. Ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking.

Hours-15

Module-V:

IP Spoofing & Denial Of Service IP Spoofing, Denial of Service (DoS), TCP SYN Flood Attack using hping3,Detecting TCP Syn Flood attacks using Wireshark, Detecting TCP Syn Flood attacks using netstat, Suggesting & Implementing Countermeasures

Hours-15

Course Outcomes:

CO-1: Gain the knowledge of the use and availability of tools to support an ethical hack

CO-2: Gain the knowledge of interpreting the results of a controlled attack

CO-3: Understand the role of politics, inherent and imposed limitations and metrics for planning of a test

CO-4: Comprehend the dangers associated with penetration testing

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2							2
CO2	3	2	3	2	2							2
CO3	3	2	2	2	2							2
CO4	3	2	3	1	2							2
Avg	3.0	2.0	2.75	1.75	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0

TEXT BOOK:

1. James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press.

Reference Books:

1. Dominic Chell , Tyrone Erasmus, Shaun Colley, Oflie Whitehouse, The Mobile Application Hacker's Handbook , Wiley
2. Michael Gregg, "Certified Ethical Hacker (CEH) Cert Guide", Pearson India, 2014
3. Rafay Baloch, "Ethical Hacking and Penetration Testing Guide" CRC Press
4. Allen Harper , Shome Harris, Jonathan Ness ,Chris Eagle, Gideon Lenkey,TerronVilliams "Gray Hat Hacking The Ethical Hakers Handbook." TMH
5. Patrick Engebretson, "The Basics of Hacking and Penetration Testing, Second Edition:Ethical Hacking and Penetration Testing Made Easy, 2nd Edition, Elsevier
6. Jon Erickson "HACKING, The art of Exploitation", William Pollock.