GURU KASHI UNIVERSITY

B.Tech Computer Science & Engineering

Session : 2022-23

Department of Computer Science & Engineering

PROGRAMME LEARNING OUTCOMES

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
4. Use research-based knowledge and research methods including design of Experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communicate effectively on complex engineering activities with the Engineering community and with society at large, such as, being able to Comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

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Programme Structure

Semester: 1st						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**
BCS101	Basic Electrical Engineering	Core course	3	1	0	4
BCS102	Physics (semiconductor Physics)	Core course	3	1	0	4
BCS103	Mathematics-1 (Calculus & Linear Algebra)	Core course	3	1	0	4
BCS104	Engineering Graphics & Drawing	Technical Skill	1	0	4	3
BCS105	Physics (semiconductor Physics) Lab	Technical Skill	0	0	2	1
BCS106	Basic Electrical Engineering Lab	Technical Skill	0	0	2	1
BCS107	Computer Fundamentals & Its Applications lab	Ability Enhancement	0	0	2	1
Discipline Elective-I (Any one of the following)						
BCS108	Fundamental of Computer and Information Technology	Discipline Elective	3	0	0	3
BCS109	Basics of Management					
BCS110	Basics of Information Technology					
Total			**13**	**3**	**10**	**21**

Semester: 2nd						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**
BCS201	Engineering Chemistry	Core course	3	1	0	4
BCS202	Mathematics-II (Probability and Statistics)	Core course	3	1	0	4
BCS203	Programming for Problem Solving	Technical Skill	3	0	0	3
BCS204	Communication Skills	Technical Skill	3	0	0	3
BCS205	Manufacturing Practices	Technical Skill	1	0	4	3
BCS206	Engineering Chemistry Lab	Technical Skill	0	0	2	1
BCS207	Programming for Problem Solving Lab	Technical Skill	0	0	2	1
BCS208	Communication Skills Lab	Technical Skill	0	0	2	1
Value added course(Any one of the following)						
BCS209	Numerical Aptitude and Reasoning Ability	VAC	1	0	0	1
BCS210	Digital Marketing					
BCS211	Stress Management					
Discipline Elective-II (Any one of the following)						
BCS212	Cyber Law and Ethics	Discipline Elective	3	0	0	3
BCS213	Ethical Hacking					
BCS214	System Analysis Design					
Total			**17**	**2**	**10**	**25**
Semester: 3rd						

Course Code	Course Title	Type of Course	L	T	P	Credits
BCS301	Object Oriented Programming Using C++	Core course	3	1	0	4
BCS302	Data structure & Algorithms	Core course	3	1	0	4
BCS303	Digital Electronics	Technical Skill	3	0	0	3
BCS304	Mathematics-III (Differential Calculus)	Core Course	3	1	0	4
BCS305	Object Oriented Programming Using C++ Lab	Technical Skill	0	0	4	2
BCS306	Data structure & Algorithms Lab	Technical Skill	0	0	4	2
BCS307	Digital Electronics Lab	Technical Skill	0	0	2	1
BCS308	Summer/Institutional Training	Technical Skill	NA	NA	NA	2
BCS399		MOOC	-	-	-	-
Discipline Elective-III (Any one of the following)						
BCS309	Computer Peripherals and Interfacing	Discipline Elective	3	0	0	3
BCS310	System Programming					
BCS311	Microprocessor & its Applications					
Total			**15**	**3**	**10**	**25**

Note: Institutional Training will be imparted in the Institute at the end of 2nd Semester for 6-weeks duration. **However this Subject is not applicable to LEET Students. * (S/US) Satisfactory/Unsatisfactory**

Semester: 4th

Course Code	Course Title	Type of Course	L	T	P	Credits
BCS401	Discrete Mathematics	Core course	3	1	0	4
BCS402	Operating System	Core course	3	1	0	4
BCS403	Design & Analysis of Algorithms	Technical Skill	3	0	0	3
BCS404	Computer Organization & Architecture	Technical Skill	3	0	0	3
BCS405	Operating System Lab	Technical Skill	0	0	2	1
BCS406	Design & Analysis of Algorithms Lab	Technical Skill	0	0	2	1
BCS407	Environmental Studies	Environmental Studies	2	0	0	2
BCS415	Basics of Management	Value Added Couse	2	0	0	2
Discipline Elective-IV (Any one of the following)						
BCS408	Network Security	Discipline Elective	3	0	0	3
BCS409	E-Commerce					
BCS410	Management Information System					
Open Elective Course						
		Open Elective	2	0	0	2
Total			19	2	4	25
Open Elective Course(Any one of the following)						
BCS411	Organizational Behavior	Open Elective	2	0	0	2
BCS412	Human Value and Ethics					
BCS413	Professional Communication					
Semester: 5th						

Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**
BCS501	Software Engineering	Core course	3	1	0	4
BCS502	Formal Language and Automata Theory	Core course	3	1	0	4
BCS503	Relational Database Management system	Technical Skill	3	0	0	3
BCS504	Computer Graphics	Technical Skill	3	0	0	3
BCS505	Relational Database Management System Lab	Technical Skill	0	0	2	1
BCS506	Computer Graphics Lab	Technical Skill	0	0	2	1
BCS507	Entrepreneurship Development	Entrepreneurship Skill	2	0	0	2
BCS599		MOOC	-	-	-	-
Discipline Elective-V (Any one of the following)						
BCS508	Soft Computing	Discipline Elective	3	0	0	3
BCS509	Big Data					
BCS510	Multimedia and Applications					
Total			**17**	**2**	**4**	**21**
Semester: 6th						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**
BCS601	Java Programming	Core course	3	1	0	4
BCS602	Computer Programming Using Python	Core course	3	1	0	4
BCS603	Data Commutation &Computer Network	Technical Skill	3	0	0	3
BCS604	Operational Research	Research Skill	3	1	0	4
BCS605	Computer Programming Using Python Lab	Technical Skill	0	0	2	1
BCS606	Java Programming Lab	Technical Skill	0	0	2	1

Disciplinary Elective-VI(Any one of the following)						
BCS607	Artificial Intelligence	Discipline Elective	3	0	0	3
BCS608	Advanced Computer Architecture					
BCS609	Adhoc & Sensor Network					
Discipline Elective-VII(Any one of the following)						
BCS610	Data ware housing & Data Mining	Discipline Elective	3	0	0	3
BCS611	Cloud Computing					
BCS612	Mobile Application Development					
Total			**18**	**3**	**4**	**23**
Semester: 7th						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**
BCS701	Research Methodology	**Research Skill**	3	1	0	4
BCS702	Web Designing and Development	Core course	3	1	0	4
BCS703	Internet of Things	Core course	4	0	0	4
BCS704	Block chain Architecture Design	Technical Skill	3	0	0	3
BCS705	Web Designing and Development Lab	**Technical Skill**	0	0	2	1
BCS706	Project-1	**Research Skill**	0	0	4	2
BCS799		**MOOC**	-	-	-	-
Disciplinary Elective-VIII(Any one of the following)						
BCS707	Natural language processing	Discipline	3	0	0	3
BCS708	Design & Development of					

	Applications	Elective				
BCS709	Wireless Communication					
Total			13	2	6	**21**
Semester: 8th						
Course Code	**Course Title**	**Type of Course**	**Hours per week**			**Credits**
			Lecture	**Tutorial**	**Practical**	
BCS801	Industrial Training	**Research Skill**	NA	NA	NA	20
Total						**20**
Grand Total			**115**	**17**	**48**	**192**

SEMESTER-I

Course Title: Basic Electrical Engineering

L	T	P	Cr
3	1	0	4

Course Code: BCS101

Total hours:60

Course Outcome: On successful completion of this course, students will be able to:

1. Discuss the DC and AC electrical circuit elements with RLC in detail.
2. Analysis of simple circuits with dc excitation. Superposition, The venin and Norton Theorems.
3. Analyze Single Phase AC Circuits and representation of alternating quantities and determining the power in these circuits.
4. Classify the different types of Electrical machines.
5. Understand the different type of electrical installation devices

Course Content

UNIT-1 **16 Hours**

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirch off current and voltage laws, analysis of simple circuits with dc excitation. Superposition, The venin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-II **14 Hours**

Transformers: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.Auto-transformer and three-phase transformer connections.

Electrical Machines : Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss

components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-III **15 Hours**

Power Converters: DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

UNIT-IV **15 Hours**

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Reading

(i) Kothari, D. P. and Nagrath, I. J. (2010). *Basic Electrical Engineering*. Tata McGraw Hill.

(ii) Kulshreshtha, D. C. (2009). *Basic Electrical Engineering*. McGraw Hill.

(iii) Bobrow, L. S. (2011). *Fundamentals of Electrical Engineering*. Oxford University Press.

(iv) Hughes, E. (2010). *Electrical and Electronics Technology.* Pearson,

SEMESTER-I

Course Title: Physics (Semiconductor Physics.)

Course Code: BCS102

L	T	P	Cr
3	1	0	4

Total Hours: 60

Course learning outcomes: On successful completion of this course, students will be able to:

1. Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
2. Use the knowledge regarding calculus along with physical principles to effectively solve problems encountered in everyday life, further study in science, and in the professional world.
3. Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.
4. Assess the contributions of physics to our evolving understanding of global change and sustainability while placing the development of physics in its historical and cultural context.
5. Acknowledge the concepts of induction and self-induction, to solve problems using Faraday's and Lenz's laws and analyze and solve RL circuits

Course Content

UNIT-I **16 Hours**

Electrostatics in vacuum Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Farady's cage and coffee-ring effect; Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

Electrostatics in a linear dielectric medium: Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; solving simple electrostatics problems in presence of dielectrics – Point charge at the center of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field.

UNIT-II **14 Hours**

Magneto statics : Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

Magneto statics in a linear magnetic medium : Magnetization and associated bound currents; auxiliary magnetic field ; Boundary conditions on and. Solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials.

UNIT-III **15 Hours**

Faraday's law: Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law; Electromagnetic breaking and its applications; Differential form of Faraday's law expressing curl of electric field in terms of time-derivative of magnetic field and calculating electric field due to changing magnetic fields in quasi-static approximation; energy stored in a magnetic field.

Displacement current, Magnetic field due to time-dependent electric field and Maxwell's equations: Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time- dependent electric field; calculating magnetic field due to changing electric fields in quasi- static approximation. Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Pointing vector with examples. Qualitative discussion of momentum in electromagnetic fields.

UNIT-IV **15 Hours**

Electromagnetic waves: The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

Suggested Readings

(i) David J Griffths. (1999). *Introduction to Electrodynamics*. Prentice Hall.

(ii) Walker, Jearl, David Halliday, and Robert Resnick. (2011). *Fundamentals of Physics*. Hoboken, N.J: Wiley.

(iii) Saslow, W. (2008). *Electricity, magnetism and light*. e-book.

SEMESTER-I

Course Title: Mathematics –I (Calculus and Linear Algebra)

L	T	P	Cr
3	1	0	4

Course code: BCS103

Total Hours: 60

Course learning outcomes: On successful completion of this course, students will be able to:

1. Perform matrix operations and solve the matrix equation using elementary matrix operations
2. Use systems of linear equations and matrix equations to determine linear dependency or independency and Evaluate the values and corresponding eigenvectors for a linear transformation
3. Set up and evaluate multiple integrals for regions in the plane to find area of the region bounded by curves and volume, surface area, Mass, C.G and M.I of solid geometric figures.
4. Demonstrate the fundamental theorem of calculus and use it for evaluating definite integrals and derivatives of integrals with variable limits of integration
5. Distinguish between the concepts of *sequence and series,* and determine limits of sequences and convergence and approximate sums

Course Content

UNIT-I

15 Hours

Calculus: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Calculus: Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and Hospital's rule; Maxima and minima.

UNIT-II **15 Hours**

Sequences and series: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT-III **15 Hours**

Multivariable Calculus (Differentiation): Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

UNIT-IV **15 Hours**

Matrices: Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Suggested Readings

(i) Thomas, G.B. & Finney, R.L. (2002). *Calculus and Analytic geometry*, 9th Edition, Pearson, Reprint.

(ii) Kreyszig, Erwin. (2006). *Advanced Engineering Mathematics*. 9th Edition, John Wiley & Sons.

(iii) Veerarajan, T. (2008). *Engineering Mathematics for first year.* Tata McGraw-Hill, New Delhi.

(iv) Ramana, B.V. (2010). *Higher Engineering Mathematics*, Tata McGraw Hill New Delhi, 11th Reprint.

(v) Poole, D. (2005). *Linear Algebra*: *A Modern Introduction*, 2nd Edition, Brooks/Cole.

(vi) Bali, N.P. &Goyal, Manish. (2008). *A text book of Engineering Mathematics*. Laxmi Publications, Reprint.

(vii) Grewal, B.S. (2010). *Higher Engineering Mathematics*. Khanna Publishers, 36th Edition.

SEMESTER-I

L	T	P	Cr
1	0	4	3

Course Title: Engineering Graphics & Design

Course Code: BCS104

Total Hours: 45

Course learning outcomes: On successful completion of this course, students will be able to:

1. Understand about engineering drawing applications and its importance in society.
2. Learn about the visual aspects of engineering design.
3. Understand the engineering graphics standards.
4. Understand the concept of solid modeling techniques.
5. Apply the computer-aided geometric design in engineering

Course Content

UNIT-1 **15 Hours**

Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

Orthographic Projections covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

UNIT-1I **15 Hours**

Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT-III **13 Hours**

Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

Overview of Computer Graphics covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

Customization& CAD Drawing consisting of set up of the drawing page and the printer, including scale settings,

Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

UNIT-IV **17 Hours**

Annotations, layering & other functions covering applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerance techniques; dimensioning and scale multi views of dwelling;

Demonstration of a simple team design project that illustrates Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerance; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying color coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modeling (BIM).

Suggested Readings

1. Gill, P.S.(2001).*Engineering Drawing*. S.K; Kataria and Sons ,Ludhiana.
2. Bhatt, N.D.(2012).*Engineering Drawing*. Charotar Book Stall, TulsiSadan, Anand.
3. French, T.E. and Vierck. C.J.(1993).*Graphic Science*. McGraw-Hill, New York.
4. Zozzora, F.(1958).*Engineering Drawing*.McGraw Hill, NewYork.

(Corresponding set of) CAD Software Theory and User Manuals

SEMESTER-I

Course Title: Physics (Semiconductor Physics) Lab

L	T	P	Cr
0	0	2	1

Course Code: BCS105

Total Hours: 15

Course learning outcomes: On successful completion of this course, students will be able to:

1. Classify solids on the basis of band theory and to calculate conductivity of semiconductors
2. Explain the working p-n junction diode
3. Determine gradient, divergence and curl of scalar and vector fields
4. To formulate and solve the engineering problems on electromagnetism
5. Evaluate thermal properties of solids using statistical approach

Course Content

Choice of experiments from the following:

- Experiments on electromagnetic induction and electromagnetic breaking;
- LC circuit and LCR circuit;
- Resonance phenomena in LCR circuits;
- Magnetic field from Helmholtz coil;
- Measurement of Lorentz force in a vacuum tube.

SEMESTER-I

Course Title: Basic Electrical Engineering Lab

L	T	P	Cr
0	0	2	1

Course code: BCS106

Total Hours: 15

Course learning outcomes: On successful completion of this course, students will be able to:

1. Implement different circuits and verify circuit concepts for DC circuits.
2. Measure the impedance of series RL, RC and RLC circuits.
3. Prove the various theorems used to reduce the complexity of electrical network.
4. Determination of efficiency of a single-phase transformer by direct load test

Course Content

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
- Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super-synchronous speed.
- Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.

- Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

SEMESTER-I

Course Title: Computer Fundamentals & Its Applications lab

L	T	P	Cr
0	0	2	1

Course code: BCS107

Total Hours: 15

Course learning outcomes: On successful completion of this course, students will be able to:

1. Understanding the concept of input and output devices of Computers
2. Study to use the Internet safely, legally, and responsibly.
3. Understand an operating system and its working, and solve common problems related to operating systems
4. Learn basic word processing, Spreadsheet and Presentation Graphics Software skills

Course Content

1. Various Components of a Computer.
2. Introduction to Microsoft Word & Presentation
3. Make a simple presentation on your college,
4. use 3D effects , on prescribed presentation
5. Applications of Ms-Office Ms-Word
6. Ms-Excel
7. Ms-PowerPoint
8. Create web pages for your college using different tags.
9. web Browser and E- Mail
10. Conversion of a word documents into PDF/ Image conversion using image file format.

SEMESTR-I

Course Title: Fundamental of Computer and Information Technology.

Course code: BCS108

L	T	P	Cr
3	0	0	3

Total Hours: 30

Course learning outcomes: On successful completion of this course, students will be able to:

1. Understanding the concept of input and output devices of Computers
2. Study to use the Internet safely, legally, and responsibly.
3. Understand an operating system and its working, and solve common problems related to operating systems
4. Learn basic word processing, Spreadsheet and Presentation Graphics Software skills
5. Learn the functional units and classify types of computers, how they process information and how individual computers interact with other computing systems and devices.

Course Content

UNIT-I **10 Hour**

Computer Hardware / Software- Definition, History, Generation, Characteristics, Types & Applications, Overview of a computer system:

Hardware/Software-Definition of Hardware**,** Input Unit: Keyboard, Mouse, Scanner etc**,** CPU: Arithmetic Logic Unit (ALU), Control Unit (CU), Memory Unit (MU)**,** Output Unit: Monitor, Printer etc**,** Storage Devices: Primary &Auxulary Memory (Floppy Disk, Hard Disk, Compact Disk, DVD, Flash Disk etc)**,** Others: Network Card, Modem, Sound Card etc.

Software: Definition & types of Software, Programming Language, Liveware, Firmware and Cache Memory

UNIT-II **5Hour**

Setting & Protection of Computer Room and Computer- Concept of **Computer related threats** (virus, worms, Trojan, phishing etc) remedies and protection

File Management basics: Physical structure of disk

UNIT-III **10Hour**

Concept of E-mail / Internet / Extranet, World Wide Web (WWW)- Familiarity with internet browsers (eg.Inernet Explorer, Firefox, Opera, Safari, Google Chrome etc.), Introduction of IP address, submet mask and default gateway, Introduction to Network Media, topology and protocol, Setting up Microsoft Network, Dial-Up Networking

UNIT-IV **10 Hour**

- **Number System**: Introduction to binary, octal, decimal and hexadecimal number system
- Introduction to ASCII and Unicode standards

SEMESTER-I

Course Title: Basics of Management

L	T	P	Cr
3	0	0	3

Course Code: BCS109

Total Hours: 45

Course learning outcomes: On successful completion of this course, students will be able to:

1. Evaluate the global context for taking managerial actions of planning, organizing and controlling.
2. Assess global situation, including opportunities and threats that will impact management of an organization.
3. Integrate management principles into management practices.
4. Assess managerial practices and choices relative to ethical principles and standards.
5. Specify how the managerial tasks of planning, organizing, and controlling can be executed in a variety of circumstances.

Course Content

UNIT-I **15 Hours**

Principles of Management: Introduction, definition and importance of management, Functions of Management, Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling. Concept and Structure of an Organization Types of industrial organization: Line organization, Functional organization, Line and Functional organization. Hierarchical Management Structure: Top, middle and lower level management, Departmentalization Introduction and its advantages.

Work Culture: Introduction and importance of Healthy Work Culture in organization, Components of Culture, Importance of attitude, values and behavior, Behavioral Science – Individual and group behavior, Professional ethics – Concept and need of Professional Ethics.

UNIT-II **15 Hours**

Leadership and Motivation: Leadership: Definition and Need of Leadership, Qualities of a good leader, Manager vs. leader, Motivation: Definition and characteristics of motivation, Factors affecting motivation, Maslow's Need Hierarchy Theory of Motivation, Job Satisfaction.

Legal Aspects of Business: Introduction and Need, Labour Welfare Schemes: Wage payment: Definition and types, Incentives: Definition, need and types, Factory Act 1948, Minimum Wages Act 1948.

UNIT-III **15 Hours**

Management Scope in different Areas: Human Resource Development: Introduction and objective, Manpower Planning, recruitment and selection, Performance appraisal methods. Material and Store Management: Introduction, functions and objectives of material management, Purchasing: definition and procedure, Just in time (JIT). Marketing and Sales: Introduction, importance and its functions, Difference between marketing and selling, Advertisement- print media and electronic media, Market-Survey and Sales promotion. Financial Management – Introduction: Concept of NPV, IRR, Cost-benefit analysis, Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund, Maintenance Management , Concept , Preventive Maintenance.

UNIT-IV **15 Hours**

Miscellaneous Topics: Customer Relationship Management (CRM): Definition and Need, Types of CRM, Customer satisfaction. Total Quality Management (TQM): Inspection and Quality Control, Concept of Quality Assurance, TQM. Intellectual Property Rights (IPR): Introduction, definition and its importance, Infringements related to patents, copyright, trade mark.

Suggested Readings

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications PvtLimited Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
6. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.
9. Intellectual Property Rights and the Law by Dr. GB Reddy.
10. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
11. Customer Relationship Management: A step-by-step approach, Mohamed & Sagadevan Oscar Publication, Delhi
12. Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi.

SEMESTER-I

Course Title: Basics of Information Technology

L	T	P	Cr
3	0	0	3

Course code: BCS110

Total Hours: 30

Course learning outcomes: On successful completion of this course, students will be able to:

1. Define computer with his/he own sentences.
2. Aware themselves about basic of computer and its evolution.
3. Provide knowledge of different units of computer like processing unit, IO unit, and storage unit.
4. operate windows OS and its features. • DOS OS and its internal and external commands.
5. To understand the computational problems, identify and abstract the programming task involved.

Course Content

UNIT I **10 Hour**

Information Technology – its concept and scope, applications of IT, impact of computer and IT in society.Computers for information storage, information seeking, information processing and information transmission

Computer Application in office, book publishing, data analysis, accounting, investment, inventory control, graphics, Air and Railway Ticket reservation, robotics, Military, banks, Insurance financial transactions and many more.

UNIT II **10 Hour**

Elements of computer system, computer hardware and software; data types – numeric data, alpha numeric data; contents of a program, processing. Computer organization, block diagram of a computer, CPU, memory

Input devices; keyboard, Scanner, mouse etc; output devices; VDU and Printer, Plotter

Electrical requirements, inter-connections between units, connectors and cables

Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and

DVD), primary and secondary memory: RAM, ROM, PROM etc., Capacity; device controllers, serial port, parallel port, system bus

UNIT III **5Hour**

Basics of Networking – LAN, WAN, Topologies , Ethics and information Technology. Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file. Creating and operating on a folder . Changing setting like, date, time, colour (back ground and fore ground)

UNIT IV **5Hour**

MS-Word : File Management: Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file.

Page Set up: Setting margins, tab setting, ruler, indenting.

SEMESTER-II

Course Title: Engineering Chemistry

Course Code: BCS201

L	T	P	Cr
3	1	0	4

Total Hours: 60.

Course learning Outcomes: On successful completion of this course, students will be able to:

1. Demonstrate Schrodinger equation, Particle in a box solution and their applications for conjugated molecules and Nanoparticles,
2. Evaluate band structure of solids and the role of doping on band structures.
3. Distinguish the ranges of Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging
4. Rationalize periodic properties such as ionization potential, electro-negativity, Oxidation states and electro-negativity.
5. List the Thermodynamic functions: energy, entropy and free energy and also Estimations of entropy and free energies.

Course Content

UNIT-1 **17Hours**

Atomic and molecular structure

Schrodinger equation, Particle in a box solution and their applications for conjugated molecules and Nanoparticles, Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and

benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Spectroscopic techniques and applications Principles of spectroscopy and selection rules, Electronic spectroscopy, Fluorescence and its applications in medicine, Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques, Diffraction and scattering.

UNIT-II **15 Hours**

Ionic, Dipolar and Vander Waals interactions, Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf.Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria, Water chemistry, Corrosion, Use of free energy considerations in metallurgy through Ellingham diagrams.

UNIT-III **15 Hours**

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

UNIT-IV **13 Hours**

Organic reactions and synthesis of a drug molecule Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Suggested Readings

i. Mahan, B. H. (1987). University chemistry.

ii. Sienko, M. J. & Plane, R. A. *Chemistry. (1979): Principles and* Applications. New York: McGraw-Hill.

iii. Banwell, C. N. (1966). *Fundamentals of Molecular Spectroscop.* New York, McGraw-Hill.

iv. Tembe, B. L., Kamaluddin& Krishnan, (2008). M. S. *Engineering Chemistry (NPTEL Web-book).*

SEMESTER-II

Course Title: Mathematics –II (probability and statistics.)

Course Code: BCS202

L	T	P	Cr
3	1	0	4

Total Hours: 60

Course learning outcomes: On successful completion of this course, students will be able to:

1. Demonstrate the methods of forming and solving Ordinary differential equations and Solve linear differential equations with constant and variable coefficients
2. Explain the concept of differential equation and classifies the differential equations with respect to their order and linearity.
3. Solve first-order ordinary and exact differential equations and converts separable and homogeneous equations to exact differential equations by integrating factors.
4. Apply the method of undetermined coefficients to solve the non-homogeneous linear differential equations with constant coefficients.
5. Compare the Methods of Cauchy's Riemann Integral and Analytical methods .

Course Content

UNIT-I **15 Hours**

Multivariable Calculus (Integration): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

UNIT-II **15 Hours**

First order ordinary differential equations:

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Ordinary differential equations of higher orders:

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT-III **15 Hours**

Complex Variable – Differentiation

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties

UNIT-IV **15 Hours**

Complex Variable – Integration

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula(without proof), Liouville's theorem and Maximum-Modulus theorem (without proof);Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Suggested Readings

1. Thomes, G.B.and Finney, R.L.(2010)*Calculus and Analytic Geometry*; Ninth Edition; Pearson Education
2. Kreyszig, E. (1998) *Advanced Engineering Mathematics*; Eighth Edition, John Wiley and sons.
3. Grewal, B.S. (1965) *Higher Engineering Mathematics*; Khanna Publishers, New Delhi.
4. Babu Ram(2009) *Advance Engineering Mathematics*; First Edition; Pearson Education.
5. Richard Courant and Fritz John (2012) *Introduction to Calculus and Analysis, Volume II ,* **V** Springer Publication
6. Harold M. Edwards (2013) *Advanced Calculus: A Differential Forms Approach*, Birkha user.

SEMESTER-II

Course Title: Programming for Problem Solving

Course Code: BCS203

L	T	P	Cr
3	0	0	3

Total Hours:45

Course learning outcomes: On successful completion of this course, students will be able to:

1. Design the algorithms to write a programs.
2. Apply arrays, pointers and structures to formulate algorithms and programs
3. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration
4. To implement conditional branching, iteration and recursion
5. Test and execute the programs and correct syntax and logical errors

Course Content

UNIT I **15 Hours**

Introduction to Programming

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) -

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory

Locations, Syntax and Logical Errors in compilation, object and executable code-

UNIT-II **15 Hours**

Arithmetic expressions and precedence (

Conditional Branching and Loops

Writing and evaluation of conditionals and consequent branching

Iteration and loops

Arrays

Arrays (1-D, 2-D), Character arrays and Strings

Basic Algorithms

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of Equations, notion of order of complexity through example programs (no formal definition requ

UNIT-III **8Hours**

Function

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference.

Recursion

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-IV **7 Hours**

Structure

Structures, Defining structures and Array of Structures

Pointers

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Readings

1. Byron Gottfried, Schaum's (1995), *Outline of Programming with C,* McGraw-Hill

2. E. Balaguruswamy (2005) Programming in ANSI C, Tata McGraw-Hill

SEMESTER-II

Course Title: Communication Skills

Course Code: BCS204

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course learning outcomes: On successful completion of this course, students will be able to:

1. Develop vocabulary and improve the accuracy in Grammar.
2. Apply the concepts of accurate English while writing and become equally ease at using good vocabulary and language skills.
3. Develop and Expand writing skills through Controlled and guided activities.
4. Compose articles and compositions in English.
5. Become autonomous and self-directed English language learners.

Course Content

UNIT-I **15Hours**

Vocabulary Building

The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.

UNIT-II **15Hours**

Basic Writing Skills

Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely.

UNIT-III **8Hours**

Identifying Common Errors in Writing

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clich

UNIT-IV **7Hours**

Nature and Style of sensible Writing

Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion

Writing Practices

Comprehension, Précis Writing, Essay Writing

Suggested Readings:

1. Swan, Michael. (1995). *Practical English*. OUP.
2. Wood, F.T. (2007). *Remedial English Grammar*. Macmillan.
3. Zinsser, W. (2001). *On Writing Well*. Harper Resource Book.
4. Lyons, L. H. &Heasly, B. (2006). *Study Writing*. Cambridge University Press.
5. Kumar, S &Lata, P. (2011). *Communication Skills*. Oxford University Press.
6. CIEFL, Hyderabad. *Exercises in Spoken English. Parts. I-III*. Oxford University Press.

SEMESTER-II

Course Title: Manufacturing Practices

Course Code: BCS205

L	T	P	Cr
1	0	4	3

Total Hours: 45

Course learning outcomes: On successful completion of this course, students will be able to:

1. Apply the various manufacturing methods in different fields of engineering.
2. Learn about the different fabrication techniques.
3. Learn about the practices in manufacturing of simple components using different materials.
4. Understand the advanced and latest manufacturing techniques being used in engineering industry.
5. Prepare different sand molds for various parts

Course Content

UNIT I **4 Hours**

Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods

CNC machining, Additive manufacturing

UNIT II **3 Hours**

Fitting operations & power tools

Electrical & Electronics

Carpentry

UNIT III **2 Hours**

Plastic moulding, glass cutting

Metal casting

UNIT IV **60 Hours**

Welding (arc welding & gas welding), brazing [More hours can be given to Welding for Civil Engineering students as they may have to deal with Steel structures fabrication and erection; 3D Printing is an evolving manufacturing technology and merits some lectures and hands-on training.]

Workshop Practice:

1. Machine shop - 10 hours

2. Fitting shop - 8 hours

3. Carpentry - 6 hours

4. Electrical & Electronics - 8 hours

5. Welding shop - 8 hours (Arc welding 4 hours) + gas welding 4 hours))

6. Casting - 8 hours

7. Smithy - 6 hours

8. Plastic moulding& Glass Cutting -6 hours

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Suggested Readings

1. Raghuwanshi, B.S.(2009*). A Course in Workshop Technology, Vol 1 &II*.DhanpatRai&Sons.
2. Jain, R.K.(2010*).Production Technology* .Khanna Publishers.
3. Singh, S.(2003).*Manufacturing Practice*. S.K. Kataria&Sons.

SEMESTER-II

Course Title: Engineering Chemistry Lab

L	T	P	Cr
0	0	2	1

Course Code: BCS206

Total Hours: 15

Course learning outcomes: On successful completion of this course, students will be able to:

1. Estimate rate constants of reactions from concentration of reactants/products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
3. Apply the theoretical concepts for result analysis and interpret data obtained from experimentation
4. Identify the compound using a combination of qualitative test and analytical methods

Course Content

Choice of 10-12 experiments from the following:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction

7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg .

SEMESTER-II

Course Title: Programming for Problem Solving Lab

Course Code: BCS207

L	T	P	Cr
0	0	2	1

Total Hours: 15

Course learning outcomes: On successful completion of this course, students will be able to:

1. Create, read and write to and from simple text files.
2. Identify and correct logical errors encountered at run time
3. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration
4. Represent data in arrays, strings and structures and manipulate them through a program
5. Test and execute the programs and correct syntax and logical errors

Course Content

Problem solving using computers

Familiarization with programming Environment

Variable types and type conversions

Simple computational problems using arithmetic expressions

Branching and logical expressions

Problems involving if-then-else structures

Loops, while and for loops

Iterative problems e.g., sum of series

1D Arrays: searching, sorting

1DArray manipulation

2D arrays and Strings, memory structure

Matrix problems, String operations

Functions, call by value

Simple functions

Numerical methods (Root finding, numerical differentiation, numerical integration)

Numerical methods problems

Recursion, structure of recursive calls

Recursive functions

Pointers, structures and dynamic memory allocation

Pointers and structures

File handling

File operations

Suggested Readings

1. Byron Gottfried, Schaum's (1995), *Outline of Programming with C,* McGraw-Hill

2. E. Balaguruswamy (2005) Programming in ANSI C, Tata McGraw-Hill.

SEMESTER-II

Course Title: Communication Skills Lab

Course Code: BCS 208

L	T	P	Cr
0	0	2	1

Total Hours: 15

Course learning outcomes: On successful completion of this course, students will be able to:

1. Illustrate the importance of pronunciation and apply the same day to day conversation
2. Apply verbal and non-verbal communication techniques in the Professional Environment
3. Develop coherence, cohesion and competence in Oral discourse.
4. Handle the interview process confidently.
5. Communicate contextually in specific personal and professional situations with courtesy.

Course Content

Oral Communication

(This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace

- Interviews
- Formal Presentations

SEMESTER-II

Course Title: Numerical Aptitude and Reasoning Ability

L	T	P	Cr.
1	0	0	1

Course Code: BCS209

Total Hours: 15

Course learning outcomes: On successful completion of this course, students will be able to:

On successful completion of this course, students would be able to:

1. Understand the basic concepts of quantitative ability
2. Understand the basic concepts of logical reasoning Skills
3. Acquire satisfactory competency in use of reasoning
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability
5. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT-I **4Hours**

Numerical problem- Percentages *(like profit & loss %, marks, shares etc.,)*, Time & Work, Speed & Distance problems, Fraction, Ratios, Average & Volume, Factoring *(LCM, HCF),* Mensuration formulas, Simple interest & Compound interest .

UNIT-II **4Hours**

Logical Reasoning- Statements & Assumption, Syllogism, Puzzles, Constraint-Based Reasoning, Proposition Testing, Course of Action, Assertion and Reason, Input Output Relations, Conclusion Estimation from Passages, Cause and Effect Reasoning, Theme Detection etc.

UNIT-III **4Hours**

Verbal Reasoning: Analogy, Series Completion, Blood Relations, Venn Diagrams, Sequential Output Tracing, Ranking & Time Sequence Test, Alphabet Test, Logical

Sequence of Words, Inserting the Missing Character, Data Sufficiency, Arithmetical Reasoning Questions, Coding-Decoding, Puzzle Test, Eligibility Test, Situation Reaction Test, Assertion & Reason, etc.

UNIT-IV **3Hours**

Non-Verbal Reasoning: Mirror Images, Reverse Images, Spotting Embedded Figures, Figure Matrix, Paper Folding, Cubes & Dice, Construction of Squares & Triangles, Grouping of Identical Figures, Paper Cutting, Rule Detection, Dot Situation, Figure Formation & Analysis, Series, Classification, Analogy etc.

SEMESTER-II

Course Title: Digital Marketing

L	T	P	Cr.
1	0	0	1

Course code: BCS210

Total Hours: 15

Course Learning Outcomes:

On successful completion of this course, students would be able to:

1. Use digital marketing to increase sales in today's business world.
2. Use Google AdWords and can optimize on-page / off-page.
3. Maintain a good social media strategy.
4. Understand web analytics to optimize your website for better traffic and revenue generation.
5. Grasp the concepts and become familiar management of e-commerce store, marketing and uploading of products on website.

Course Content

UNIT-I **4Hours**

Introduction to Digital Marketing: ROI between Digital and traditional marketing, Ecommerce, Digital marketing a boon or a Bane, Analysis of recent info graphics released by companies about digital marketing, Diagnosis of the present website and business, Swot analysis of business, present website and media or promotion plan, Setting up vision, mission, and goals of digital marketing, website, Levels of websites, Diff b/w Blog, Portal and Website, Diff b/w websites either static or dynamic.

UNIT-II **4Hours**

Search Engine Optimization: On page optimization, off page optimization, and how to prepare a reports like- Keywords, titles, Meta tags etc. On page optimization techniques, Off page Optimization techniques, Reports.

UNIT-III **4Hours**

Social Media Optimization : Introduction to social Media Marketing, Advanced Facebook Marketing, Word Press blog creation, Twitter marketing, LinkedIn Marketing, Google plus marketing, Social Media Analytical Tools.

UNIT-IV **4Hours**

Search Engine Marketing: Introduction to Search Engine Marketing, Tools used for Search engine Marketing, PPC /Google Adwords Tool, Display advertising techniques, Report generation. Google Analytics. Online Reputation Management-Mail Marketing, Affiliate Marketing, Social Media Analytics, Ad designing.

SEMESTER: II

Course Title: STRESS MANAGEMENT
Course Code: BCS211

L	T	P	Cr.
1	0	0	1

Course Outcomes:

On successful completion of this course, students would be able to:

1. Identify the nature and causes of stress in organizations
2. Knowledge of stress prevention mechanism
3. Demonstrate the strategies that help cope with stress
4. Apply stress management principles in order to achieve high levels of performance
5. Adopt effective strategies, plans and techniques to deal with stress

Course Content

UNIT I **Hours: 4**

1. Understanding Stress (7 hours)
1.1 Stress – concept, features, types of stress
1.2 Relation between Stressors and Stress
1.3 Potential Sources of Stress – Environmental, Organizational and Individual
1.4 Consequences of Stress – Physiological, Psychological and Behavioural Symptoms
1.5 Stress at work place – Meaning, Reasons
1.6 Impact of Stress on Performance
1.7 Work Stress Model
1.8 Burnout – Concept
1.9 Stress v/s Burnout

UNIT II **Hours: 4**

2. Managing Stress – I (8 hours)
2.1 Pre-requisites of Stress-free Life
2.2 Anxiety - Meaning, Mechanisms to cope up with anxiety
2.3 Relaxation - Concept and Techniques
2.4 Time Management - Meaning, Importance of Time Management
2.5 Approaches to Time Management
2.6 Stress Management - Concept, Benefits
2.7 Managing Stress at Individual level
2.8 Role of Organization in Managing Stress/ Stress Management Techniques
2.9 Approaches to Manage Stress - Action oriented, Emotion oriented, Acceptance oriented.

UNIT III **Hours: 4**

3. Managing Stress – II (7 hours)
3.1 Models of Stress Management - Transactional Model, Health Realization/ Innate Health Model
3.2 General Adaption Syndrome (GAS) - Concept, Stages

3.3 Measurement of Stress Reaction - The Physiological Response,
3.4 The Cognitive Response, TheBehavioural Response.
3.5 Stress prevention mechanism - Stress management through mind control and purification theory and practice of yoga education.
3.6 Stress management interventions: primary, secondary, tertiary.
3.7 Meditation – Meaning, Importance

UNIT IV **Hours: 4**

4. Stress Management Leading to Success (8 hours)
4.1 Eustress – Concept, Factors affecting Eustress
4.2 Stress Management Therapy - Concept, Benefits
4.3 Stress Counselling - Concept
4.4 Value education for stress management
4.5 Stress and New Technology
4.6 Stress Audit Process
4.7 Assessment of Stress - Tools and Methods
4.8 Future of Stress Management

Suggested Readings

1. Heena T. Bhagtani. (2018). Stress Management. Himalaya Publishing House.
2. Dutta, P,K, (2010) Stress Management. Himalaya Publishing House.
3. Roy,S (2012). Managing Stress. Sterling Publication.

SEMESTER-II

Course Title: Cyber Law and Ethics

Course Code: BCS212

L	T	P	Cr.
3	0	0	3

Total Hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Analyse the concept of cybercrimes.
2. Learn about the regulation of cyber space at national and international level.
3. Learn the international legal regime related to cybercrimes.
4. Discuss the offences and penalties under it act 2000.
5. Discuss the scope of consumer protection in e-commerce.

Course Content

UNIT – I **15 Hours**

General introduction and Cyber space regulations: Cyber Space-Meaning and characteristics Need for regulation of cyber space, Cyber-libertarianism, Cyber-paternalism, Lessing's model of regulation, Regulators in cyberspace, Introduction to Internet, ACLU v Reno, Digitization and Society, Legal Challenges of the Information Society, Information Technology Act, 2000

UNIT – II **10Hours**

Cyber law and IPR issues: Digital Copyrights, Open Source, Linking and caching, Digital Rights Management, DMCA, - Patents, Software Patents Trademarks and domain names, Brand identities, search engines and secondary market, ICANN, Database Right

UNIT- III **10Hours**

Cyber law and privacy and taxations issues: Digitization, personal data and data industry, Data protection principles, Conditions for processing of personal data, CCTV, RFID tracking, Data retention and identity - Taxation issues of e-commerce

UNIT – IV **10Hours**

Cyber Crimes: Computer misuse - identity theft, grooming and harassment, Hacking, Viruses, criminal damage and mail bombing, Denial of service attack, Obscenity, child abuse, Stalking. Morphing, web jacking, phishing etc., Cyber terrorism, Bandwidth theft, Convention on cyber crime

Transactional Modes

- Video based Teaching, Collaborative Teaching, Cooperative Teaching, Case based Teaching, Case Analysis, Group Discussion

Suggested Readings

- Senthil, Surya and Devi Lakshmi (2010). *Manual of Cyber Laws***.** New Delhi: Aditya Book Company.
- Singh, Ranbir and Singh Ghanshyam (2004). *Cyber Space and the Law: Issues and Challenges* ,Hyderabad: Nalsar University.

SEMESTER-II

Course Title: Ethical Hacking
Course Code: BCS213

L	T	P	Cr.
3	0	0	3

Total Hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. To gain knowledge about Ethical hacking and penetration testing.

2. To learn about various types of attacks, attackers and security threats and vulnerabilities present in the computer system.

3. To examine how social engineering can be done by attacker to gain access of useful & sensitive information about the confidential data.

4. To learn about cryptography, and basics of web application attacks.

5 To gain knowledge of the tools, techniques and ethical issues likely to face the domain of ethical hacking and ethical responsibilities.

Course Content

UNIT –I **15Hours**

Introduction to Ethical Hacking: Hacking Methodology, Process of Malicious Hacking, Foot printing and Scanning: Foot printing, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques

UNIT –II **10Hours**

Hacking Methodology: Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques

UNIT –III **10Hours**

Web and Network Hacking: SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls

UNIT – IV **10Hours**

Report writing & Mitigation: Introduction to Report Writing & Mitigation, requirements for low level reporting &high-level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

Transactional Modes

- Video based Teaching, Collaborative Teaching, Cooperative Teaching, Case based Teaching, Case Analysis, Group Discussion

Suggested Readings

1. L. Krutz Ronald. Vines Russell Dean, *The CEH Prep Guide: The Comprehensive Guide to Certified Ethical Hacking*, First Edition, Wiley Publications.
2. Palmer, C. C. (2001). Ethical hacking. *IBM Systems Journal*, *40*(3), 769-780.
3. Farsole, A. A., Kashikar, A. G., &Zunzunwala, A. (2010). Ethical hacking. *International Journal of Computer Applications*, *1*(10), 14-20.

SEMESTER-II

Course Title: System Analysis Design

Course Code: BCS214

L	T	P	Cr.
3	0	0	3

Total Hours: 60

Course Learning Outcome:

1. Experience in developing information systems models;
2. Experience in developing systems project documentation;
3. Explore the technical risks involved in the system's and technical possibilities.
4. Make the feasibility study about the system.

Course Content

UNIT I **15Hours**

System Development Fundamentals: system concept and need for system approach, definition of system, factoring into subsystem, black box system, introduction to the basic elements of the system, different types and behavior of the system.

UNIT II **10Hours**

Software Development life cycle (SDLC): need of SDLC, different phases in SDLC, role of system analyst SDLC models

UNIT III **10Hours**

System Analysis: importance of planning and control, information gathering, tools of structured analysis, system design, logical and physical design, methodologies, file organization.

UNIT IV **10Hours**

System Implementation: need of testing, test plan, post implementation review, project scheduling, selection of hardware and software

Security and Recovery In System Development: System Security, Control Measures, Disaster /Recovery Planning, Ethics In System Development, Case Study

Suggested Readings

1. System analysis and design – E.M. Awad
2. System analysis and design- Dennis Wixom

SEMESTER-III

Course Title: Object Oriented Programming Using C++

Course Code: BCS301

L	T	P	Cr.
3	1	0	4

Total Hours: 60

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
2. Illustrate dynamic memory management techniques using pointers, constructors, destructors, etc.
3. Construct the concept of function overloading, operator overloading, virtual functions and polymorphism
4. Classify inheritance with the understanding of early and late binding, usage of exception handling and generic programming.
5. Demonstrate the use of various OOPs concepts with the help of programs.

COURSE CONTENT

UNIT-I **15Hours**

Object-Oriented Programming Concepts: Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

UNIT-II **15Hours**

Standard Input/output: Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of i/o stream classes, formatting output, formatting using ions class functions and flags, formatting using manipulators. Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifies, and static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

UNIT-III **15Hours**

Pointers and Dynamic Memory Management: Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic),dynamic memory management using new and delete operators, pointer to an

object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures. Constructors/Destructors and Operator Overloading and Type Conversion: Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initialize lists. Overloading operators, rules for overloading operators, overloading of various operators, type conversion - basic type to class type, class type to basic type, class type to another class type

UNIT-IV 15Hours

Inheritance and Virtual functions & Polymorphism: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors. Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors.

Suggested Readings

1. Lafore R.(1992).*Object Oriented Programming in C++.* Waite Group.
2. Bjarne Stroustrup.(1985).*The C++ Programming Language*. Addison Wesley.
3. Herbert Schildt.(1994).*The Complete Reference to C++ Language.* McGrawHill-Osborne.
4. Lippman F. B.*(*1997).*C++ Primer*. Addison Wesley.

SEMESTER-III

Course Title: Data Structure& Algorithms

Course Code: BCS302

L	T	P	Cr.
3	1	0	4

Total Hours: 60

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Describe how arrays, records, linked structures, stacks, queues, trees and graphs are represented in memory and used by algorithms
2. Write programs that use arrays, records, linked structures, stacks, queues and trees.
3. Develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching and sorting of each data structure.
4. Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack
5. Solve problems involving graphs, trees and heaps.

COURSE CONTENT

UNIT-I **15Hours**

Introduction: Basic Terminologies, Elementary Data Organizations, Data Structure Operations insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT-II **15Hours**

Stacks and ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each Types of Queues: Algorithms and their analysis.

Linked Lists: Singly linked lists, Representation in memory, Algorithms of several operations, Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, doubly linked list, operations on it and algorithmic analysis; Circular Linked Lists, all operations their algorithms and the complexity analysis.

UNIT-III **15Hours**

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their

algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree, definitions, algorithms and analysis.

UNIT-IV **15Hours**

Sorting and Hashing: Objective and properties of different sorting algorithms, Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing. Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Suggested Readings

1. . Mark Allen Weiss.*(1995). Algorithms, Data Structures, and Problem Solving with C++*
   Algorithms. Addison-Wesley.
2. R. G Dromey(2006*). How to Solve it by Computer*. Pearson Education.

SEMESTER-III

Course Title: Digital Electronics

Course code: BCS303

L	T	P	Cr.
3	0	0	3

Total hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Examine the fundamentals concepts and techniques used in digital electronics
2. Examine the structure of various number systems and its application in digital design.
3. Analyze and design various combinational and sequential circuits.
4. Categorize a digital logic and apply it to solve real life problems.
5. Recommend to solve the real world problems.

COURSE CONTENT

UNIT-I **15Hours**

Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples officiates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lcs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT-II **10Hours**

Standard representation for logic functions: K-map representation and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De- Multiplexer/Decoders, Adders, Sub-tractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT-III **10Hours**

Sequential circuits and system: A 1-bit memory, the circuit properties of Bus table latch, the clocked SR flip flop, J- K-T and D- Types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, application counters. A/D and D/Converters

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, Specifications for D/A converters, examples of D/A converter lcs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converters.

UNIT-IV **10Hours**

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Suggested Readings

1. R. P. Jain.(2009*). Modern Digital Electronics.* McGraw Hill Education.
2. M. M. Mano.(2016). *Digital logic and Computer design.* Pearson Education India.
3. A. Kumar.(2016*). Fundamentals of Digital Circuits*. Prentice Hall India.

SEMESTER-III

Course Title: Mathematics-III (Differential Calculus)

Course Code: BCS304

L	T	P	Cr.
3	1	0	4

Total Hours:60

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

1. Apply the fundamental concepts of Ordinary Differential Equations and Partial Differential Equations and the basic numerical methods for their resolution
2. Solve the problems choosing the most suitable method.
3. Analyse the difficulty of solving problems analytically and the need to use numerical approximations for their resolution.
4. Use computational tools to solve problems and applications of Ordinary Differential Equations and Partial Differential Equations
5. Formulate and solve differential equation problems in the field of Industrial Organization Engineering.

COURSE CONTENT

UNIT-I 15Hours

Partial Differential Equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for x and Claimant's type. First order partial differential equations, solutions of first order linear and non-linear .Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Flows, vibrations and diffusions, second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems), D' Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation.

UNIT-II 15Hours

Numerical Methods: Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8rules.

Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods.

UNIT-III **15Hours**

Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender- Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

UNIT–IV **15Hours**

Transform Calculus Polynomials – Orthogonal Polynomials – Lagrange's, Chebysev Polynomials; Trigonometric Polynomials; Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving odes and pdes by Laplace Transform method. Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications.

Suggested Readings

1. G.B. Thomas and R.L. Finney. (2002). *Calculus and Analytic geometry*. 9thEdition, Pearson, Reprint.
2. Erwin Kreyszig. (2006*). Advanced Engineering Mathematics*.9th Edition, John Wiley &Sons.
3. D. Poole. (2005*). Linear Algebra: A Modern Introduction*. 2nd Edition, Brooks/Cole.
4. Veerarajan T. (2008).*Engineering Mathematics* for first year. Tata McGraw-Hill, New Delhi.
5. RamanaB.V. (2010*). Higher Engineering Mathematics*. Tata McGraw-Hill New Delhi, 11thReprint.

SEMESTER-III

Course Title: Object Oriented Programming Using C++ Lab

Course Code: BCS305

L	T	P	Cr.
0	0	4	2

Total Hours: 30

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Develop solutions for a range of problems using objects and classes.
2. implement the concept of constructors, destructors and operator overloading
3. Apply algorithmic problems including type casting,
4. inheritance, and polymorphism.
5. understand generic programming, templates, file handling

COURSE CONTENT

practical 1 Program to show the of use cin, cout practical 2 Program to implement the operators

practical 3 Program based on decision making statement (if else)

practical 4 Program based on the loops(while,do while)

practical 5 Program based on loops(for),switch statement

practical 6 Program based on structures and enumerated data types

practical 7 Program based functions, overloaded functions

practical 8 Program to show usage of storage classes.

practical 9 Program to show usage of function overloading, default arguments

practical 10 Program to show usage of classes, objects

practical 11 Program to show usage of constructors, destructors

practical 12 Program to manipulate arrays and array of objects

practical 13 Program to manipulate strings.

practical 14 Program to show usage of inheritance of various type (multiple, multilevel etc.)

practical 15 Program to show usage of unary operator overloading

practical 16 Program to show usage of binary operator overloading

practical 17 Program for conversion from basic to user defined data type

practical 18 Program for conversion from user defined to basic

practical 19 Program to show usage of basics of pointers

practical 20 Program to show usage of pointers and arrays.

practical 21 Program to show usage of pointers, function arguments

practical 22 Program to show usage of new, delete, memory management

practical 23 Program to show usage of virtual function

practical 24 Program to show usage of friend, static function

practical 25 Program to show usage of overloaded assignment operator, this pointer

practical 26 Program to read & write contents of a text file

practical 27 Program to show usage of file pointers.

practical 28 Program to show usage of command line arguments

practical 29 Program to show usage of overloading of right & left shift operators.

practical 30 Program to show usage of exception handling mechanism

practical 31 Program to show usage of uncaught_ exception(), the exception and bad exception classes

practical 32 Program to show usage of templates

practical 33 Program to show usage of generic classes

practical 34 Implementation of File handling

practical 35 Implementation of Wrapper classes

practical 36 Implementation of container classes

SEMESTER-III

Course Title: Data Structure & Algorithm Lab

Course Code: BCS306

L	T	P	Cr.
0	0	4	2

Total Hours: 30

Course Learning Outcomes: On successful completion of this course, the students will be able to**:**

1. Develop C program for Linear data structure operations and its applications
2. Design and Implement basic operations such as insertion, deletion, search on stacks, queues, linked list, Circular Queue etc.
3. Implement Breadth First Search Techniques and Depth First Search Techniques
4. Implement the binary search tree.
5. Implement Dijkstra and warshall's algorithms to find shortest path.

COURSE CONTENT

1. Write a program to insert an element into an array.
2. Write a program to delete an element from an array.
3. Write a program to implement linear search algorithm.
4. Write a program to implement binary search algorithm.
5. Write a program to implement bubble sort algorithm.
6. Write a program to implement selection sort algorithm.
7. Write a program to implement PUSH operation in stacks.
8. Write a program to implement POP operation in stacks.
9. Write a program to implement Queues.
10. Write a program to insert an element in the beginning of the link list.
11. Write a program to insert an element in the middle of the link list.
12. Write a program to insert an element in the end of the link list.
13. Write a program to delete an element from the beginning of the link list.

14. Write a program to delete an element from the end of the link list.
15. Write a program for implementation of a graph.
16. Write a program for implementation of binary search tree.

SEMESTER-III

Course Title: DIGITAL ELECTRONICS LAB

Course Code: BCS307

L	T	P	Cr.
0	0	2	1

Total Hours:15

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Classify the design combinational circuit and sequential circuit.
2. Examine half adder using XOR and NAND gates and verification of their operation
3. Design and implement 4bit adder, 2's complement sub tractor circuit using a 4 bit adder IC.
4. Relate Boolean laws to simplify the digital circuits.
5. Compare and contrast various hazards and timing problems in a digital design.

COURSE CONTENT

1. a) Verification of the truth tables of TTL gates, e.g., 7400, 7402, 7404, 7408, 7432, 7486.

   b) Design, fabrication and testing of low frequency TTL clocks using NAND gates.

2. a) Verification of the truth table of the Multiplexer 74150.

   b) Verification of the truth table of the De-Multiplexer 74154.

4. Design and verification of the truth tables of half adder and full adder circuits using gates 7843.

5. Study and verification of the operations of ALU 74181 with regard to addition / subtraction /comparison.

6. Design, fabricate and test a switch denounce using 7400.

7. Design and test of an S-R flip-flop using NOR/NAND gates.

8. Verify the truth table of a J-K flip-flop(7476)

9. Verify the truth table of a D flip-flop (7474) and study its operation in the toggle and asynchronous modes.

SEMESTER-III

Course Title: Computer Peripherals and Interfacing

L	T	P	Cr.
3	0	0	3

Course Code: BCS309

Total Hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Learn various functional units of a computer system.
2. Prepare the student to be in a position to design a basic computer system.•
3. Evaluate the operation of major building blocks available in the system.•
4. Exposure about the recent trends in parallel& distributed computing & multithreaded application is given to the students.
5. Learn the communication of various components through common bus.

Course Content

UNIT-I **15Hours**

Video Display : The basic principle of working of video monitors (CRT, LCD,LED), video display adapters, video modes, Video display EGA/VGA/SVGA/PCI adapters and their architecture, Overview of raster scan, vector graphic, their main difference and relative advantages, Concept of reduction and bandwidth of monitors refreshing of screen. Hardware Organization of PCs: Types of motherboard and their details (Form Factor, Chipset), types of processors (INTEL, AMD) and their compatibility with motherboards, serial and parallel ports, PS/2, USB Ports, Interconnection between units, connectors and cables.

UNIT-II **10Hours**

Storage Devices: Types of Hard Disk Drives- EIDE, SATA, SCSI, SAS External Hard Disk. Constructional features and working of hard disk drive, optical (CD, DVD, Blue Ray) disk drive and Flash Drive, Logical structure of Hard Disk and its organization, boot record. Input Devices: Detailed working

principle and troubleshooting of various input devices such as keyboard, mouse, and scanner. Basic principle of touch screen, light pen, digitizers. Drivers for various input devices and their role. Output

UNIT-III **10Hours**

Devices: Overview of printer and its classification, impact and non-impact printer, principle and working of desk Jet, dot matrix, line Printer and laser printers (Monochrome and Colour), plotter (Piezoelectric and Thermal), and modems. Software drivers for various output devices and their role.

Power Supplies: Explain the working of SMPS used in computers. On-Line/Off-line/Line-Interactive/uninterrupted power supplies (UPS), basic principle of working their importance and maintenance.

UNIT-IV **10Hours**

The Basic Input/output System: What is BIOS? Function of BIOS, software interrupts Testing and initialization, configuring the system.

Other Technologies: Mobile, digital camera, web camera, smart card, ATMs, CDMA etc., Blue Tooth, infrared, Wi-Fi, Wi Max. Some aspects of cost performance analysis while procuring the computer.

Suggested Readings

1. Govinda Rajalu.(1991). *Hardware Trouble Shooting and Maintenance*. B. IBM PC and Clones, Tata McGraw Hill .
2. Robert, S Lai.(1992).*The waite group writing MS DOS Device, Drives Addison*. Wesley Publishing Co. 2nd Ed.

SEMESTER-III

Course Title: System Programming

Course Code: BCS310

L	T	P	Cr.
3	0	0	3

Total Hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Explain basic concepts in systems programming.
2. Ability to devise, select, and use modern techniques and tools needed for the design and implementation of system programs.
3. Understand the structure and design of assemblers, linkers and loaders.
4. Understand the concepts and theory behind the implementation of high level programming languages.
5. Study the architecture of a hypothetical machine, its assembly language, macro language.

Course Content

UNIT- I

Editors:

1. Line editor, Full screen editor and multi window editor.
2. Case study MS-Word, DOS Editor and vi editor.

Assemblers:

1. First pass and second pass of assembler and their algorithms.
2. Assembler Database.

UNIT-II

Linkers and Loaders:

1. Concept of linking.
2. Concept of Loader.
3. Various loading schemes

Compilers:

1. Introduction to various translators.
2. Various phases of compiler.
3. Introduction to Grammars and finite automata.
4. Bootstrapping for compilers.

UNIT-III

Debuggers:

1. Introduction to various debugging techniques.
2. Case Study: - Debugging in Turbo C++ IDE.

UNIT-IV

Macro Language & Macro Processor:

1. Macro instruction.
2. Features of a Macro Facility
3. Detailed study & Implementation.

Suggested Readings

1. Donovan J.J., Systems Programming New York, Mc-Graw Hill, 1972.
2. Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.

SEMESTER-III

Course Title: Microprocessor and its Application

L	T	P	Cr.
3	0	0	3

Course Code: BCS311

Total Hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Describe the architecture & organization of 8085 & 8086 Microprocessor.
2. Understand and classify the instruction set of 8085/8086 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.
3. Relate the addressing modes used in the instructions.
4. Realize the Interfacing of memory & various I/O devices with 8085/8086 microprocessor.
5. Familiarize the architecture and operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessor.

Course Content

UNIT I **10Hours**

Introduction: Generic Architecture of Microprocessor, Overview of 8085 microprocessor, Architecture, Instruction Set, Interrupts and Programming Examples.

UNITII **15Hours**

INTEL 8086 Microprocessor: Pin Functions, Architecture, Characteristics and Basic Features of Family, Segmented Memory, Interrupt Structures, INTEL 8086 System Configuration, Description of Instructions, Addressing Modes, Assembly directives. Assembly software programs with algorithms, Loops, Nested loops, Parameter Passing etc.

UNITIII **10Hours**

Interfacing with 8086: Interfacing of RAMs and ROMs along with the explanation of timing diagrams. Interfacing with peripheral ICs like 8255, 8254, 8279, 8259, 8251 etc.

UNITIV **10Hours**

Advanced Microprocessors: Overview of x86 (80186, 80286, 80386, 80486) family and Pentium Microprocessors. Need for Flexible Logic and Evolution of Microprocessors, Applications.

Books

1. Gaonkar, Ramesh., Microprocessor Architecture, Programming and Applications with the 8085, 6th edition, Penram International Publishing India PVT. LTD. (2013).

2. Hall, D.V., Microprocessor and Interfacing, 3rd edition, Tata McGraw Hill Publishing Company (2009).

3. Barry B. Brey, Intel Microprocessors, 8th edition, Prentice Hall, PEARSON (2012).

Suggested Readings

1. Gibson, Glenn A., Liu, Yu-Cheng., Microcomputer Systems: The 8086/8088 FamilyArchitecture Programming and Design, 2nd edition, Pearson (2001)

SEMESTER-IV

Course Title: Discrete Mathematics

Course Code: **BCS401**

L	T	P	Cr.
3	1	0	4

Total Hours: 60

Course Learning Outcome: On completion of this course, the successful students will be able to:

1. Use mathematically correct terminology and notations
2. Construct correct direct and indirect proofs.
3. Use division into cases in a proof.
4. Use counter examples.
5. Apply logical reasoning to solve a variety of problems

COURSE CONTENT

UNIT-I **15Hours**

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT-II **15Hours**

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination. Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT-III **15Hours**

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi- Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.

UNIT-IV **15Hours**

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Aurelian and Hamiltonian Walks, Graph Coloring, Coloring maps and Planar Graphs, Coloring Vertices, Coloring Edges, List Coloring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

Suggested Readings

1. J.P. Tremblay and R. Manohar. (1997). *Discrete Mathematical Structure and Its Application to Computer Science"*. TMG Edition, Tatamcgraw-Hill.
2. Norman L. Biggs. (2010). *Discrete Mathematics*. 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, MarcLipson.
3. Mott, Abraham Kandel. (2011). *Discrete Mathematic.* Tata McGraw-Hill.

SEMESTER-IV

Course Title: Operating System

L	T	P	Cr.
3	1	0	4

Course Code: BCS402

Total Hours:60

Course Learning Outcomes: On successful completion of this course, the students will be able to

1. Design the algorithms to write programs.
2. Apply arrays, pointers and structures to formulate algorithms and programs
3. Apply programming to solve simple numerical method problems, namely rot finding
4. Function, differentiation of function and simple integration
5. To implement conditional branching, iteration and recursion Test and execute the programs and correct syntax and logical errors

COURSE CONTENT

UNIT-I **15Hours**

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System**.**

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Contexts witching

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

UNIT-II **15Hours**

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem,

Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problematic.

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery

UNIT-III **15Hours**

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation– Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation –Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used(LRU).

UNIT-IV **15Hours**

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

Suggested Readings

1. Charles Crowley. (1996). Operating System; *A Design-oriented Approach.* 1st Edition, Irwin Publishing.

2. Gary J. Nutt, Addison. (2002) .*Operating Systems: A Modern Perspective*. 2nd Edition Wesley.

3. Maurice Bach, Prentice-Hall of India (1986).*Design of the Unix Operation Systems.* 8th Edition.

4. Daniel P. Bovet, Marco Cesati, O'Reilly and Associates.(2005).*Understanding the Linux Kernel.* 3rd Edition

SEMESTER-IV

Course Title: Design and analysis of algorithm

Course Code: BCS403

L	T	P	Cr.
3	0	0	3

Total hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Describe the greedy paradigm and develop the greedy algorithms.
2. Implement and examine the divide-and-conquer paradigm.
3. Develop the dynamic programming algorithms and evaluate their computational complexity.
4. Implement the graphs to find shortest path.
5. Synthesize efficient algorithms in common engineering design situations.

Course Content

UNIT-I **15Hours**

Introduction: Algorithm and its importance, Mathematical foundations- Growth functions, Complexity analysis of algorithms.

Divide and Conquer: Basic technique and its application on Binary Search, Finding Maximum and Minimum and on sorting techniques such as Merge Sort, Quick Sort.

UNIT II15Hours

Greedy Algorithms: General method, Using greedy algorithm to solve Knapsack problem, Minimum-Cost spanning trees problem, Single source shortest path problem and Travelling salesperson problem.

Dynamic Programming: Introduction to dynamic programming and application of the algorithm to solve multistage graphs, all pair's shortest path problem and Knapsack problem.

UNIT III08Hours

Backtracking: General backtracking algorithm, Application of backtracking to 8 Queens' problem, Sum of subsets, Graph coloring, Hamiltonian cycles and Knapsack problem.

String Matching Algorithms: Introduction, Brute Force algorithm, Rabin-Karp algorithm, KMP algorithm, and Boyer-Moore algorithm.

UNIT IV 07Hours

NP-completeness and Approximation Algorithms: Introduction to P, NP, NP-hard and NP complete problems, Examples of NP-complete problems, Introduction to approximation algorithms, Absolute approximations, E-approximations

Suggested Readings

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms" Galgotia Publications.

2. Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, and Clifford Stein, "Introduction to Algorithms", MIT Press.

3. Sanjoy Dasgupta, Christos Papadimitriou, and UmeshVazirani, "Algorithms", McGraw-Hill Education.

4. Michael T. Goodrich and Roberto Tamassia, "Algorithm Design: Foundations, Analysis, and Internet Examples", Wiley.

5. Alfred V. Aho, John E. Hopcroft, and Jeffrey. D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education. 6. John Kleinberg and Eva Tardos, "Algorithm Design", Pearson Education

SEMESTER-IV

Course Title: Computer Organization & Architecture

L	T	P	Cr.
3	0	0	3

Course Code: BCS404

Total Hours:45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Summarize the basic concept of computer fundamentals, Number system, Boolean algebra, Karnaugh map and Perform problems
2. Explain the concept of stored program, role of operating system, Instruction sets and Addressing modes and Demonstrate problems on Addressing modes.
3. Develop control unit and Explain the concept of various I/O operations
4. Explain the concept of Instruction pipeline, RISC, CISC
5. Design of adders, ALU and Memory management unit and Illustrate problems related to cache memory

Course Content

UNIT-I **15Hours**

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL0interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common set.

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. Multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

UNIT-II **10Hours**

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-program design approaches, Case study –

design of a simple hypothetical CPU.

Memory system design: semiconductor memory technologies, memory organization.

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers-program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB

UNIT III **10Hours**

Pipelining: Basic concepts of pipelining, through put and speedup, pipeline hazards. Parallel Processors: Introduction to parallel-processors, Concurrent access to memory and cache coherency.

UNIT IV **10Hours**

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. Block size, mapping functions, replacement algorithms, write policies.

Suggested Readings

1. John P. Hayes. (1988). *Computer Architecture and Organization.* 3rd Edition, WCB/McGraw- Hill.
2. William Stallings. (2016). *Computer Organization and Architecture. Designing for Performance.* 10th Edition, Pearson Education.
3. Vincent P. Heuring and Harry F. Jordan. (2004). *Computer System Design and Architecture*, 2nd Edition by Pearson Education.

SEMESTER-IV

Course Title: Operating System lab

L	T	P	Cr.
0	0	2	1

Course Code: BCS405

Total Hours: 15

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Install Linux operating system.
2. Develop and debug the various Linux commands.
3. Perform various shell commands.
4. Develop shell programming & its concepts.
5. Appreciate the advantages of Linux OS.

Course Content

Installation Process of various operating systems

1. Commands for files & directories: cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. File comparisons. Disk related commands: checking disk free spaces. Processes in Linux, connecting processes with pipes, background processing, managing multiple processes. Manual help. Background process: changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, Cal, banner, touch, file. File related commands ws, sat, cut, grep.
2. Shell Programming: Basic of shell programming, various types of shell, Shell Programming in bash, conditional & looping statement, case Statement, parameter passing and arguments, shell variables, shell keywords, creating shell programs for automate system tasks, report printing.

SEMESTER-IV

L	T	P	Cr.
0	0	2	1

Course Title: Design & Analysis Algorithm lab

Course Code: BCS406

Total Hours: 30

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Examine randomized algorithms.
2. Analyze the performance of algorithms.
3. Describe and implement the dynamic-programming paradigm.
4. Describe and implement the greedy paradigm.
5. Analyze worst case running times of algorithms using asymptotic analysis.

Course Content

1. Write a program to implement bubble sort algorithm by comparing its complexity.
2. Write a program to implement linear search algorithm by comparing it complexity.
3. Write a program to implement binary search algorithm by comparing its complexity.
4. Write a program to implement PUSH operation in stacks.
5. Write a program to implement POP operation in stacks.
6. Write a program to implement Queues.
7. Write a program to insert an element in the beginning of the link list.
8. Write a program to delete an element from the middle of the link list.
9. Write a program to implement the concept of queen's problem.

SEMESTER-IV

Course Title: Environmental studies

Course Code: BCS407

L	T	P	Cr.
2	0	0	0

Total Hours: 30

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Examine all aspects of environmental issues and apply understanding from disciplines such as history, economics, psychology, law, literature, politics, sociology, philosophy, and religion to create informed opinions about how to interact with the environment on both a personal and a social level.
2. Recognize the physical, chemical, and biological components of the earth's systems and show how they function.
3. Learn lessons from various field experiences and case studies
4. Implement the independent research on human interactions with the environment.
5. Study the various disaster factors related to the environment.

Course Content

UNIT-I **10Hours**

Introduction: Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness.

Natural Resources: Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

Ecosystems: Concept of Ecosystem, Structure, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity.

UNIT-II **08Hours**

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies.

Disaster Management: Floods, earthquake, cyclone and landslides.

UNIT-III **10Hours**

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water

harvesting, watershed management. Resettlement and rehabilitation of people its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wastel and reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation Public awareness.

UNIT-IV **10Hours**

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Program. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies.

Suggested Readings

1. Agarwal, K.C. (2001). *Environmental Biology*. Nidi Publ. Ltd. Bikaner.
2. Jadhav, H &Bhosale. (1995). *V.M. Environment Protection and Laws.* Himalaya Pub House,Delhi.
3. Rao M. N. &Datta A.K. (2017). *Waste Water Treatment.* Oxford & IBH Publ. Co. Pvt.Ltd.

SEMESTER-IV

Course Title: Network Security

L	T	P	Cr
3	0	0	3

Course Code: BCS408

Total Hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Provide security of the data over the network.
2. Do research in the emerging areas of cryptography and network security.
3. Implement various networking protocols.
4. Protect any network from the threats in the world.
5. Design network application security schemes, such as PGP, S/ MIME, IP Sec, SSL, TLS,

Unit-I
15Hours

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security
Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

Unit-II **10Hours**
Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Crypt analysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution.
Asymmetric key Ciphers: Principles of public key cryp to systems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution.

Unit-III **10 Hours**

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm
Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

Unit-IV10Hours

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, key management.
Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction
Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls

SEMESTER-IV

Course Title: E-Commerce
Course Code: BCS409

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Identify the component parts of e-commerce
2. Identify the benefits of selling online
3. Know how to optimize and stay safe when selling online
4. Have an outline strategy for e-Commerce for your business
5. Understand the risks around Cyber Security when trading and doing business online.

Course Content

UNIT-I **15Hours**

Introduction to E-Commerce : Definition, Scope of E-Commerce, Hardware requirements, Ecommerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce.

UNIT-II **10Hours**

Business to Business E-Commerce: Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational E-commerce.

UNIT-III **10Hours**

Legal issues: Risks: Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.

UNIT-IV **10Hours**

Security Issues: Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic Cash over internet, Internet Security.

Business to Consumer E-Commerce: Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL.

E-business: Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E- Diversity, Case studies through internet.

Suggested Readings

1. David Whitley.(2017). *E-Commerce-Strategy, Technologies & Applications*. TMH.
2. Kamlesh K. Bajaj.(2017). *E-Commerce- The cutting edge of business*. TMH.
3. W Clarke-BPB.(2018). *E-Commerce through ASP*.
4. Mathew Reynolds, Wrox Publishers Beginning.(2000). *E-Commerce with VB, ASP, SQL Server 7.0 & MTS.*
5. J. Christopher Westland and Theodore H. K Clark.(1999).*Global Electronic Commerce- Theory and Case Studies*. University Press.

SEMESTER-IV

Course Title: Management Information System

L	T	P	Cr
3	0	0	3

Course Code: BCS410

Total Hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Describe the role of information technology and systems in business Describe the role of information technology and systems in business
2. Analyze how information technology impacts a firm and interpret how to use information technology to solve business problems
3. Identity the role played by the six major types of information systems in organizations and their relationship to each other.
4. Recognize the relationship between information systems and organizations.
5. Define the types of information systems supporting the major functional areas of

Course Content

UNIT-I **15Hours**

Management Information Systems A Framework

Importance of MIS; Management Information System: A Concept (Management, Information, And System); MIS: A Definition (Information Technology and MIS); Nature and Scope of MIS (MIS Characteristics, MIS Functions).

Structure and Classification of MIS: Structure of MIS, MIS classification, Functional Information System, Conceptual and Physical Structure of MIS.

UNIT-II **10Hours**

Decision Making System: Simon's Model, Characteristics of DSS, Structure of DSS, DSS users, Classes, Types, Decision Tree. GDSS Model, Characteristics of GDSS, users and classes of GDSS, difference between DSS and GDSS.

UNIT-III **10Hours**

Information and System Concept: Definition of information, Quality of Information, information parameters, types and dimension of Information, Classification of

information system maintenance. Definition of system, kinds of system, elements of system.

UNIT-IV **10Hours**

Organization concept: Definition of Organization, Database Hierarchy and Files used in Organization. Introduction to ERP : Definition and Significance of ERP, Benefits of ERP, ERP Implementation, ERP life Cycle Model, Role of users, Vendors and Consultants in ERP, Marketing of ERP, Future Scope of ERP Application.

Text Books:

1. D.P Goyel, Macmillan. (2006 *). Management Information Systems Managerial Perspectives*.

2. CVS Murthy. (1993). *Management Information Systems.* Himalaya Publishing House

3. Vinod Kumar Garg, N. K. Venkita Krishnan. (2003*). Enterprise Resource Planning: Concepts and Practice* Phi Learning Pvt. Ltd.

SEMESTER-IV

Course Title: Organizational Behavior

Course Code: BCS411

L	T	P	Cr
2	0	0	2

Total Hours: 30

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Understand the conceptual framework of the discipline of OB and its practical applications in the organizational set up.
2. To deeply understand the role of individual, groups and structure in achieving organizational goals effectively and efficiently.
3. To critically evaluate and analyse various theories and models that contributes in the overall understanding of the discipline.
4. To develop creative and innovative ideas that could positively shape the organizations.
5. To accept and embrace in working with different people from different cultural and diverse background in the workplace.

Course Content

UNIT-I **10Hours**

Organizational Behavior: What managers do, Definition of OB, contributing disciplines to OB, challenges and opportunities for OB. Foundations of Individual behavior- biographical characteristics, ability, and learning? Values, Attitudes, Personality and Emotions, Perception

UNIT-II **10Hours**

Motivation: Concept, Theories of Maslow, Herzberg, mcclell and, Porter & Lawler Model, Application of Motivation Concept. Job Satisfaction Foundations of Group Behavior: Group formation, development and structure, Group Processes, Group Decision- making Techniques, Work Teams.

UNIT –III **5Hours**

Interpersonal Skill-Transactional analysis, Life Positions, Johari Window. Leadership: Concept, theories, styles and their application. Power and Politics in Organization.

UNIT –IV **5Hours**

Conflict Management, Stress Management, Crisis Management, Organizational Change & Development, Innovation, Creating a learning Organization, Organizational Culture, Organizational Effectiveness.

Suggested Readings

1. Nelson, Debra L and James C Quick. (2009).*Organizational Behavior.* Thomson Learning
2. Pareek, Udai. (2007). *Understanding Organizational Behavior*. Oxford University Press, New Delhi.
3. Robbins, S.P. (2012). *Organizational Behavior.* Prentice Hall of India, New Delhi.
4. Hellgiegel, D & J.W. Slocum. (2009). *Organizational Behavior*. Thomson Learning
5. Mcschane. (2014) .Organization Behavior. TMH, New Delhi.
6. Luthans, Fred. (2010).*Organizational Behavior.* Mcgraw Hill, New York.

SEMESTER-IV

Course Title: Human Value and Ethics

L	T	P	Cr
2	0	0	2

Course Code: BCS412

Total Hours: 30

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Understand and define the concepts of integrity and ethics
2. Describe three major theoretical approaches in integrity and ethics
3. Identify ethical dilemmas and apply different theoretical approaches
4. Understand the concept of personal integrity in the context of this Module
5. understand the nature of the individual and the relationship between the self and the community

Course Content

UNIT-I **10Hours**

Human Values: Morals, Values and Ethics - Integrity - Work Ethic - Service Learning - Civic Virtue - Respect for Others - Living Peacefully - caring - Sharing - Honesty - Courage - Valuing Time - Co-operation - Commitment - Empathy - Self-Confidence - Character – Spirituality.

UNIT-II **8Hours**

Engineering Ethics: Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry- moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy - Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT-III **5Hours**

Engineering as Social Experimentation: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

UNIT-IV **7Hours**

Safety, Responsibilities and rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and Chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

SEMESTER-IV

Course Title: Professional Communication

Course Code: BCS413

L	T	P	Cr
2	0	0	2

Total Hours: 30

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Identify and describe the foundations and characteristics of mass media.

2. Demonstrate proficiency in the process and practice of media writing.

3. Create and critique media content.

4. Graduates should be able to produce media messages appropriate to the audience, purpose, and context.

Course Content

UNIT-1 **10 Hours**

Communication: Its interpretation 1. Basics 2. Nonverbal Communication 3. Barriers to Communication

Business Communication at Work Place 1. Letter Components and Layouts 2. Planning a letter 3. Process of Letter writing 4. Email Communication 5. Memo and Memo Reports 6. Employment Communication 7. Notice Agenda and Minutes of Meeting 8. Brochures

UNIT-II **7 Hours**

Required Skills 1. Reading Skills 2. Note-making 3. Précis Writing 4. Audio Visual Aids 5. Oral Communication.

UNIT-III **5 Hours**

Report Writing: 1. Effective Writing 2. Types of Business Reports 3. Structure of Reports 4. Gathering Information

UNIT-IV **8 Hours**

Effective Spoken Communication: Understanding essentials of spoken communication, Public speaking, Discussion techniques, Presentation strategies.

SEMESTER-V

Course Title: Software Engineering

Course Code: BCS501

L	T	P	Cr
3	1	0	4

Total Hours: 60

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.
2. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
3. Examine the format and cost of source code using LOC (line of code).
4. Develop and conduct appropriate experimentation, analyze and interpret data and use Engineering judgment to draw conclusions.

Course Content

UNIT-I **15Hours**

Introduction: The software engineering, Discipline-Evolution and impact, Why study software Engineering? , Emergence of software Engineering.

Software Life Cycle Models: Why use a lifecycle model? Classical waterfall Model, Iterative, Prototype, Evolutionary, Spiral Models & their Comparison.

UNIT-II **15Hours**

Software Project Management: Project Planning, Metrics for Project Size estimation-LOC and Function- Point & Feature Point, Project Estimation Techniques, COCOMO Model, Team Structure, Software Configuration Management.

Requirements Analysis and Specification: Software Requirement Specifications (SRS), Software project management, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management

UNIT-III **15Hours**

Software Design: Issues in software Design, Function oriented design, Object oriented Design, Object Modeling Using UML, and User interface Design.

Coding and Testing: Code review, Verification and validation, Unit testing, Black Box Testing, Integration and System Tes ting. Verification and validation, Integration testing, Validation testing, alpha and beta testing, System testing: Recovery testing, security testing, stress testing, performance testing; The art of debugging, process debugging approaches. Software re-engineering: Reverse engineering, restructuring, forward engineering.

UNIT-IV **15Hours**

Software Reliability and Quality Assurance: Quality concepts, Software quality assurance : SQA activities; Software reviews; cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting record keeping, review guidelines; Formal approaches to SQA; Software Maintenance: Characteristics of Software maintenance.

Suggested Readings

1. Ghezzi C., Jazayeri M. And MandrioliD. (1991). *Fundamentals of Software Engineering*. Prentice Hall, N. J.
2. Pfleedger S. L. (1991). *Software Engineering: The Production of Quality software*. Second Edition, Macmillan Publishing Company.
3. Oehm B. W. (1998). *A Spiral Model of Software Development and Enhancement*. IEEE Computer, 21.pp61-72.
4. Fairley R. (1985). *Software Engineering Concepts*. McGraw Hill, New York.

SEMESTER-V

Course Title: Formal Language & Automata Theory

Course Code: BCS502

L	T	P	Cr
3	1	0	4

Total hours: 60

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Write a formal notation for strings, languages and machines.
2. Design finite automata to accept a set of strings of a language.
3. Design context free grammars to generate strings of context free language.
4. Determine equivalence of languages accepted by Push Down Automata and languages
5. Construct context free grammars.

COURSE CONTENT

UNIT-I **15Hours**

Theory of Computation: Deterministic Finite Automata, Acceptance by Finite Automata, Transition systems, Non-Deterministic Finite Automata, Equivalence of DFA and NDFA, Moore and Mealy machines, Equivalence of Moore and Mealy machine, Minimization of Finite Automata, Applications and limitations of Finite Automata.

Formal Languages: Basics of strings, alphabets, grammar, formal language, Chomsky classification of languages, languages and their relation, operations on languages, Closure properties of language classes.

UNIT-II **15Hours**

Regular grammar: Regular grammars, Regular expressions, Algebraic method using Arden's theorem, Equivalence of Finite Automata and Regular expressions, Properties of regular languages, Pumping lemma.

UNIT-III **15Hours**

Context Free Language: Derivation, ambiguity, simplification of context free grammar, normal forms- Chomsky Normal Form, Greibach Normal Form, pumping lemma. Context Sensitive Language, The model of Linear Bounded Automata, Relation between Linear Bounded Automata and Context Sensitive Language

UNIT-IV **15Hours**

Push Down Automata: Description and Definition, acceptance by Push down Automata, Equivalence of Push down Automata and context free grammars and languages.

Turing Machine: Definition and Model, Representation of Turing Machine, Design of Turing Machine, Variants of Turing Machine, Decidability and Recursively Enumerable Languages, Halting Problem, Post Correspondence Problem.

Suggested Readings

1. Harry R. Lewis and Christos H. Papadimitriou. (1998). *Elements of the Theory of Computation.*

Pearson Education Asia.

2. Dexter C. Kozen. (1997). *Automata and Computability. Undergraduate Texts in Computer*

Science, Springer.

3. Michael Sipser. *(1997). Introduction to the Theory of Computation.* PWS Publishing.

4. John Martin. (2007). *Introduction to Languages and the Theory of Computation.* Tata McGraw

Hill.

SEMESTER-V

Course Title: Relational Database Management System

L	T	P	Cr
3	0	0	3

Course Code: BCS503

Total hours: 45

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Formulate query, using SQL, solutions to a broad range of query and data update problems.
2. Describe various database concepts and database management system software.
3. Have high-level understanding of major DBMS components and their function.
4. Design a model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.
5. Categorize SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.

Course Content

UNIT-I **15Hours**

Database Management: Introduction, Types of DBMS and their advantages and disadvantages, Characteristics of Database Approach, Data Models, Data Abstraction and Knowledge Representation, Database Language.

DBMS Architecture and Data Independence: Attributes and Keys, Relationships, Relationship Types, Roles, ER Diagrams, Relational Model concepts, functional dependence.

UNIT-II **10Hours**

SQL, PL SQL, SQL *PLUS, Managing Database and Queries: Creating, Defining and Modifying Table structure, Update Operations and Dealing With Constraint Violations, Basic Relational Algebra Operations, Example of Queries in Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus, granting and revoking privileges.

UNIT-III **10Hours**

Normalization: Overview of Recovery and Backup, Normalization & its forms.

Transaction: Processing Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes. Database recovery.

UNIT-IV **10Hours**

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, Integrity in Data Base. Types of Integrity, SQL injection.

SQL Server: Introduction to SQL Server and Oracle Server, Indexes, Views, Cursors, Packages, Triggers, Stored Procedures.

Suggested Readings

1. J. D. Ullman, Computer Science Press. (2016). *Principles of Database and Knowledge–Base Systems.* Vol1

2. R. Elmasri and S. Navathe, Pearson Education *(1905). Fundamentals of Database System.*5th Edition

3. Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley. *(1995). Foundations of Databases* Reprint.

SEMESTER-V

Course Title: Computer Graphics

Course Code: BCS504

L	T	P	Cr
3	0	0	3

Total hours: 60

Course Learning Outcomes: On successful completion of this course, the students will be able to**:**

1. Construct the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Implement 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations.
3. Solve geometric transformations on graphics objects and their application in composite form.
4. Examine the geometrical transformations and 3D viewing.
5. Outline clipping methods and its transformation to graphics display device.

Course Content

UNIT-I **15Hours**

Introduction: What is Computer Graphics, Elements of a Graphics, Applications and Components, working of Interactive Graphics, Display Processors, Graphic Devices, Raster scan and Random Scan displays, Resolution, Aspect Ratio, Refresh CRT, Color CRT monitors, Lookup tables, Plasma Panel and LCD monitors, interlacing, grey shades?

Interactive Input Devices: keyboard, mouse, trackball, joystick, light pen, digitizing tablet, image scanners, voice system.

Hard Copy Devices: printers, plotters.

UNIT-II **10Hours**

Basic Raster Graphics: Scan conversion &Drawing Geometry: Coordinate Systems; Output Primitives: symmetrical and simple DDA line drawing algorithm, Brenham's line drawing, loading frame buffer; symmetrical DDA for drawing circle,

Polynomial method for circle drawing; circle drawing using polar coordinates, Brenham's circle drawing, Filling: Stack-based seed fill algorithm, Scan-line seed fill algorithm.

UNIT-III **10Hours**

Geometric Manipulation: 2D Transformations: Translation, Rotation, Scaling, Matrix representations and Homogeneous coordinate Transformations Matrices, Homogeneous Co-ordinates. 2-DViewing: Windowing, Viewport. Clipping operations: Point and Line clipping, Cohen-Sutherland line clipping, Mid-point Sub Division line clipping, Sutherland-Hodgeman polygon clipping.

UNIT-IV **10Hours**

Elementary 3-D Graphics: 3-D Graphics, 3-D modeling of objects, 3-D transformation matrices for Translation, Scaling and Rotation, Parallel Projection: Orthographic and Oblique Projection, Perspective projection. Hidden surface removal /Visibility: Image and object precision, Z- buffer algorithms, area based algorithms, floating horizon.

Advanced Issues: Curves and surfaces: Parametric Representation, Bezier and B-Spline curves, Rendering, Raytracing, Antialiasing, fractals, Gourard and Phong shading.

Suggested Readings

1. D. Rogers and J. Adams.(1976). *Mathematical Elements for Computer Graphics*. McGraw -Hill International Edition.
2. David F. Rogers.(1997). *Procedural Elements for Computer Graphics*. McGraw Hill Book Company.
3. Newmann & Sproul.(1979). *Principles of Interactive Computer Graphics.* McGraw Hill International Edition.

SEMESTER-V

Course Title: Relational Database Management System Lab

L	T	P	Cr
0	0	2	1

Course Code: BCS505

Total hours: 30

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Explain the features of database management systems and Relational database.
2. Design conceptual models of a database using ER modeling or real life Applications and also construct queries In Relational Algebra.
3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
4. Retrieve any type of information from a data base by formulating complex queries in SQL.
5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.

Course Content

List of Experiments:

Task 1: Introduction to SQL and installation of SQL Server / Oracle.

Task 2: Data Types, Creating Tables and Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statement.

Task 3: Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statement.

Task 4: Set Operators, Nested Queries, Joins, Sequences.

Task 5: Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.

Task 6: PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.

Task 7: Stored Procedures and Exception Handling.

Task 8: Triggers and Cursor Management in PL/SQL.

Suggested Tools – My SQL, DB2, Oracle, SQL Server 2012

SEMESTER-V

Course Title: Computer Graphics Lab

Course Code: BCS506

L	T	P	Cr
0	0	2	1

Total hours: 15

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Examine the basic concepts of computer graphics.
2. Design scans conversion problems using C++ programming.
3. Explain clipping and filling techniques for modifying an object.
4. Identify the concepts of different type of geometric transformation of objects in 2D and 3D.
5. To understand the practical implementation of modeling, rendering, viewing of objects in 2D.

Course Content

List of Experiments:

Task 1: WAP to draw different geometric structures using different functions.

Task 2: Implement DDA line generating algorithm.

Task 3: Implement Bresenham's line generating algorithm.

Task 4: Implement Mid-point circle line generating algorithm.

Task 5: Implementation of Bresenham's circle drawing algorithm.

Task 6: Implementation of mid-point circle generating Algorithm.

Task 7: Implementation of ellipse generating Algorithm.

Task 8: WAP of color filling the polygon using Boundary fill and Flood fill algorithm.

Task 9: To translate an object with translation parameters in X and Y directions.

Task 10: To scale an object with scaling factors along X and Y directions.

Task 11: Program of line clipping using Cohen-Sutherland algorithm.

Task 12: To perform composite transformations of an object.

Task 13: To perform the reflection of an object about major.

SEMESTER-V

Course Title: Entrepreneurship Development

Course Code: BCS507

L	T	P	Cr
2	0	0	2

Total Hours: 30

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Assess the commercial viability of new technologies, business opportunities and existing companies
2. Plan, organize, and execute a project or new venture with the goal of bringing new products and service to the market
3. Carry out scientific research in the field of entrepreneurship
4. Improved your interpersonal and collaborative skills
5. Write scientific reports and communicate the results in a professional manner

UNIT-I **10Hours**

Introduction to Generic Skills: Importance of Generic Skill Development (GSD), Global and Local Scenario of GSD, Life Long Learning (LLL) and associated importance of GSD.

Managing Self: Knowing Self for Self Development- Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc., Managing Self – Physical- Personal grooming, Health, Hygiene, Time Management, Managing Self – Intellectual development -Information Search: Sources of information, Reading: Purpose of reading, different styles of reading, techniques of systematic reading, Note Taking: Importance of note taking, techniques of note taking, Writing: Writing a rough draft, review and final draft. Managing Self – Psychological, Stress, Emotions, Anxiety-concepts and significance, Techniques to manage the above.

UNIT-II **5Hours**

Managing in Team: Team - definition, hierarchy, team dynamics, Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background, Communication in group - conversation and listening skills.

UNIT-III **5Hours**

Task Management: Task Initiation, Task Planning, Task execution, Task close out, Exercises/case studies on task planning towards development of skills for task management

Problem Solving: Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving, Different approaches for problem solving. Steps followed in problem solving. Exercises/case studies on problem solving.

UNIT-IV **5Hours**

Entrepreneurship: Introduction , Concept/Meaning and its need, Competencies/qualities of an entrepreneur, Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level. Market Survey and Opportunity Identification (Business Planning)- How to start a small scale industry, Procedures for registration of small-scale industry, List of items reserved for exclusive manufacture in small-scale industry, Assessment of demand and supply in potential areas of growth, Understanding business opportunity, Considerations in product selection, Data collection for setting up small ventures. Project Report Preparation- Preliminary Project Report, Techno-Economic Feasibility Report, Exercises regarding "Project Report Writing" for small projects.

SEMESTER-V

Course Title: Soft Computing

Course Code: BCS508

L	T	P	Cr
3	0	0	3

Total Hours: 30

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Determine Working of a simple Genetic Algorithm and the related definitions: Representation/Encoding Schemes, initializing a GA population
2. Explain evaluation function, genetic operators, study of parameters of genetic algorithms and its performance, sampling and selection mechanisms
3. Genetic Algorithm variations: Scaling fitness, Niching and speciation, Crowding Technique for Multimodal Problems
4. Determine Neural networks: Basic terminology and definitions, Model of an artificial neuron, Sigmoid function, Neural Network Architectures, Characteristics of neural networks, Learning methods, Rosenblatt's Perception
5. Explain Fuzzy sets: Basic terminology and definitions, Operations on Fuzzy sets, MF formulations and parameterization

Course Content

UNIT– I **10Hours**

Working of a simple Genetic Algorithm and the related definitions: Representation/ Encoding Schemes, initializing a GA population, evaluation function, genetic operators, study of parameters of genetic algorithms and its performance, sampling and selection mechanisms, mathematical foundations of genetic algorithms, schemata theorem and building block hypothesis, Optimizing numerical functions using GA.

UNIT– II **10Hours**

Genetic Algorithm Variations: Scaling fitness, Niching and speciation, Crowding Technique for Multimodal Problems, Multi-Objective Genetic Algorithms, Master Slave and Distributed Genetic Algorithms, Designing GAs for numerical optimization, knapsack problem, travelling salesperson and other similar problems.

UNIT– III **10Hours**

Neural Networks: Basic terminology and definitions, Model of an artificial neuron, Sigmoid function, Neural Network Architectures, Characteristics of neural networks, Learning methods, Rosenblatt's Perceptron, Fixed increment perceptron learning algorithm for a classification problem, Examples of learning of AND/OR gate by perception, XOR problem. Back Propagation Neural Networks Architecture of a back propagation network, Model for multi-layer perceptron, Back propagation learning, Delta or gradient descent learning rule and effect of learning rate, Back propagation learning algorithm.

UNIT– IV **10Hours**

Fuzzy Sets: Basic terminology and definitions, Operations on Fuzzy sets, MF formulations and parameterization, Derivatives of parameterized MFs, Fuzzy numbers, Extension principal and fuzzy relations, Linguistic variables, Fuzzy If-Then Rules, Fuzzy reasoning and compositional rule of inference.

Software and Tools to be learnt:MATLAB tool boxes on global optimization, neural networks and fuzzy logic, R Programming, GALIB 247 and KEEL

SEMESTER-V

Course Title: Big Data

Course Code: BCS509

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome Outcomes: On successful completion of this course, the students will be able to:

1. Develop a dynamic webpage by using java script.
2. Connect a java program to a DBMS.
3. Design a well formed and valid XML and DHTML document.
4. Write a server side java application called Servlet to update and delete operations on DBMS table.
5. Design a page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page.

Course Content

UNIT-I **10Hours**

Introduction to Big Data: Overview of Big Data, Stages of analytical evolution, Challenges of Conventional Systems, Intelligent data analysis, Nature of Data, Analytic Processes and Tools, Analysis vs. Reporting, Modern Data Analytic Tools, Statistical Concepts: Sampling Distributions - Re-Sampling, Statistical Inference - Prediction Error

UNIT-II **10Hours**

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

UNIT-III **10Hours**

Hadoop: History of Hadoop, The Hadoop Distributed File System, Components of Hadoop, Analyzing the Data with Hadoop, Scaling Out- Hadoop Streaming, Design of HDFS-Java interfaces to HDFS Basics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run-Failures, Job Scheduling-Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features

UNIT-IV **10Hours**

Frameworks: Applications on Big Data Using Pig and Hive, Data processing operators in Pig Hive services, HiveQL, Querying Data in Hive, Fundamentals of HBase and Zookeeper, Visualizations: Visual data analysis techniques, interaction techniques. Systems and applications

Suggested Readings

1. Michael Berthold, David J. Hand.(2007*). Intelligent Data Analysis. Springer.*
2. Chris Eaton, Dirk De Roos, Tom Deutsch, George Lapis, Paul Zikopoulos.(2012).*Understanding Big Data: Analytics for Enterprise Class Hadoop and* Tom White, Hadoop.(2012). *The Definitive Guide Third Edition. O' reilly Media.*
3. AnandRajaraman and Jeffrey David Ullman.(2012). *Mining of Massive Datasets.* Cambridge University Press.
4. Bill Franks. (2012*). Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced B Analytics.* John Wiley & sons.

SEMESTER-V

Course Title: Multimedia and Applications

L	T	P	Cr
3	0	0	3

Course Code: BCS510

Total Hours:45

Course Learning Outcome Outcomes: On successful completion of this course, the students will be able to:

1. Describe technical characteristics and performance of multimedia system and terminals.
2. Design creative approach in application of multimedia devices, equipment and systems
3. Interpret and analyze measurement results obtained on the multimedia system and components,
4. Describe the development process and applications of the multimedia systems
5. Carry out experiments and measurements on the multimedia systems in laboratory conditions on real components

Course Content

Unit-I **10Hours**

Introduction To Multimedia Technology - computers, communication and entertainment framework for multimedia system, features of multimedia system, Multimedia Hardware devices& software development tools, M/M devices, presentation devices and the user interface, M/M presentation and authoring.

Unit-II **15Hours**

Digital Representation Of Sound And Image:-Digital representation of sound and transmission, Basics of Video, ,Types of Video Signals, Analog Video, Digital Video, brief survey of speech recognition and generation, digital video and image compression, JPEG image compression standard, MPEG motion video compression, DVI technology, timbered media representation and delivery.

Unit-III **10Hours**

M/M Software:-M/M software environments, limitations of workstation operating systems, M/M system services, OS support for continuous media applications, media stream protocol, M/M file system and information representation system, and data models for M/M and hypermedia information.

Application of M/M:-Application of M/M, intelligent M/M system.

Unit-IV **10Hours**

Virtual Reality System: Desktop VR, virtual reality OS, distributed virtual environment system, virtual environmental displays and orientation tracking, visually coupled systems requirements, intelligent VR software systems.

Multimedia Communication: Building Communication network, Application Subsystem, Transport Subsystem, QOS, Resource Management, Distributed Multimedia Systems.

Uses: Applications of environments in various fields such as medical entertainment, manufacturing, business, education etc.

Suggested Readings

1. **Stephen Mc Gloughlim**, "Multimedia on the Web", PHI.

2. **Villamil -Casanova &Nolina**, "Multimedia production, planning & Delivery", PHI.

3. **Lozano,** "Multimedia sound & video", PHI.

4. **J. Jeefcoate,** "Multimedia in Practice Tech & application".

SEMESTER-VI

Course Title: Java Programming

Course Code: BCS601

L	T	P	Cr
3	1	0	4

Total Hours: 60

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Discuss the basic concepts of java like if-else, control structures, array and strings.
2. Outline the structure and model of the Java programming language.
3. Synthesize Java programming language for various programming technologies
4. Develop software in the Java programming language on different platforms.
5. Invent software applications using applet classes in java programming language.

Course Content

UNIT-I **15Hours**

An overview of Java: Object oriented programming, two paradigms, abstraction, the OOP principles, Java class libraries

Date types, variables and arrays: Integers, floating-point types, characters, Boolean, Iterates, Variable, Data types and casting, array operators.

Operators: Arithmetic operators, bit wise operators, relational operators, Boolean logical operators, assignment operators, operator precedence

Control Statement: Java's selection Statement, iteration Statement, jump Statement.

Introduction to classes: Class fundamentals, declaring object reference variable, Introducing methods, constructors, the keywords, garbage collection, the finalize () method.

Methods and Classes: Overloading methods, using objects as parameters, recursion.

UNIT-II **15Hours**

Inheritance: Inheritance basics, using super, method overriding, dynamic method dispatch, using abstract Classes, Using final with inheritance, Package and Interfaces, Package asses protection, importing packages

Exception handling: Exception handling fundamentals, Exception types, Uncaught Exceptions, Using try and catch, multiple catch clauses, nested try Statement throw, and finally Java built in exception creating your own exception, sub classes, using exceptions.

UNIT-III **15Hours**

Multithreaded Programming: The Java thread model, the main thread, creating thread, creating multiple thread, using is alive () and join (). Thread priorities, synchronization, Inter thread communications, suspending resuming and stopping thread using multithreading.

String handling: The string constructor, string length, special string operator character extraction, string comparison, searching string, modifying string, data conversion, changing the case of characters, string buffer.

UNIT-IV **15Hours**

Networking: Networking basics, Java and the Internet Address, TCP/IP client Sockets URL, URL connection, TCP/IP server Sockets, the Applet Class.

The Applet Class: Architecture displays method, The HTML APPLET, Passing parameters to Applet. The get Documentation Base () and get Code Base () methods Applet Context and Show Document ().

Suggested Readings

1. McGraw-Hill. (1999). *Java 2 Computer Reference.* Tata McGraw Hill.
2. Horstmann. *(2018) .Core Java-I.* Addison Wesley.
3. E Balagurusami. (2006). *Programming with JAVA.* Tata McGraw-Hill Education.
4. Bruce Eckel. (2007). *Thinking in Java.* Prentice Hall.

SEMESTER-VI

Course Title: Computer Programming using Python

Course Code: BCS602

L	T	P	Cr
3	1	0	4

Total Hours: 60

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Acquire programming skills in core Python.
2. Implement Object Oriented concepts to develop live projects.
3. Design Graphical user Interfaces in Python.
4. Create database connectivity to create, search and sort the information.
5. Implement class inheritance in Python for reusability.

Course Content

UNIT-I

15Hours

Introduction: Python Installation and Working with Python, Understanding Python variables, Python basic Operators, Understanding python blocks.

Python Data Types Declaring and using Numeric data types: int, float, complex, using string data type and string operations, Defining list and list slicing, Use of Tuple data type.

Python Program Flow Control Conditional: if, else and elif, simple for loops in python, for loop using ranges, string, list and dictionaries Use of while loops in python, Loop manipulation using pass, continue, break and else Programming using Python conditional and loops block.

UNIT-II **15Hours**

Python Functions: Modules and Packages Organizing python codes using functions, organizing python projects into modules, importing own module as well as external

modules, Understanding Packages, Powerful Lambda function in python Programming using functions, modules and external packages.

Python String: List and Dictionary Manipulations Building blocks of python programs, understanding string in build methods, List manipulation using in build methods, Dictionary manipulation, Programming using string, list and dictionary in build functions.

UNIT-III **15Hours**

Python File Operation : Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(),Understanding write functions, write() and writelines(),Manipulating file pointer using seek, Programming using file operations.

Python Object Oriented Programming : Oops Concept of class, object and instances Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support.

Python Regular Expression: Powerful pattern matching and searching Power of pattern searching using regex in python, Real time parsing of networking or system data using regex, Password, email, URL validation using regular expression, Pattern finding programs using regular expression

UNIT-IV

15Hours

Python Exception Handling: Avoiding code break using exception handling, safe guarding file operation using exception handling, Handling and helping developer with error code, Programming using Exception handling

Python Database Interaction SQL: Database connection using python, creating and searching tables, Reading and storing configure information on database, Programming using database connections

Python Multithreading: Understanding threads, forking threads, synchronizing the threads.

Suggested Readings

1. John V Guttag. (2013). *Introduction to Computation and Programming Using Python Revised and expanded Edition.* MITPress

2. Robert Sedgewick, Kevin Wayne, Robert Dondero. (2016). *Introduction to Programming in Python: An Inter-disciplinary Approach.* Pearson India Education Services Pvt.Ltd.

3. Timothy A. Budd. (2015). *Exploring Python.* , Mc-Graw Hill Education (India) Private Ltd.

4. Kenneth A. Lambert. (2012). *Fundamentals of Python First Programs*", CENGAGE Learning.

5. Charles Dvierbach. (2013). *Introduction to Computer Science using Python. A Computational Problem-Solving Focus*. Wiley India Edition.

6. Paul Gries, Jennifer Campbell and Jason Montojo. (2013). *Practical Programming: An Introduction to Computer Science using Python 3.* Second edition, Pragmatic Programs, LLC.

SEMESTER-VI

Course Title: Data Commutation & Computer Network

Course Code: BCS603

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Understand the fundamentals of computer networking.
2. Learn the basic taxonomy and terminology of the computer networking area.
3. Get acquainted with various congestion control algorithms.
4. Describe the functions of the different layer of the OSI Protocol.
5. Identify the different types of network topologies and protocols.

Course Content

UNIT-I **15Hours**

Data Communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN.

Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT-II **10Hours**

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CDCDMA/CA

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT-III **10Hours**

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT-IV **10Hours**

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

Suggested Readings

1. Andrew S. Tanenbaum, Pearson New International Edition (2013). *Computer Networks.* 8th Edition.
2. Prentice Hall of India.(2015).*Internetworking with TCP/IP Volume 1.* 6th Edition Douglas Comer.
3. W. Richard Stevens, Addison-Wesley, United States of America.*(2005). TCP/I Illustrated.* Volume1.

SEMESTER-VI

L	T	P	Cr
3	1	0	4

Course Title: Operational Research

Course Code: BCS604

Total Hours: 60

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Provides a good understanding of operational research techniques, methodologies and tools
2. Helps students make better organizational and operational decisions
3. Introduces the concepts of linear programming modeling and its solution techniques
4. Explores the mathematical properties of general linear programming problems
5. Helps students solve and analyze real-world business problems

UNIT-I **15Hours**

Linear Programming: Geometry of linear programming, Graphical method, Linear programming (LP) in standard form, Solution of LP by simplex method, Exceptional cases in LP, Duality theory, Dual simplex method, Sensitivity analysis.

UNIT-II

Integer Programming: Branch and bound technique, Gomory's cutting plane method.

UNIT-III **15Hours**

Network Models: Construction of networks, Network computations, Free Floats, Critical path method (CPM), optimal scheduling (crashing). Initial basic feasible solutions of balanced and unbalanced transportation problems, optimal solutions, assignment problem. Multi objective Programming: Introduction to multi-objective linear programming, efficient solution, efficient frontier.

UNIT-IV **15Hours**

Nonlinear Programming: Unconstrained Optimization: unimodal functions, Fibonacci search method, Steepest Descent method. Constrained Optimization: Concept of convexity and concavity, Maxima and minima of functions of n-variables, Lagrange multipliers, Karush-Kuhn-Tucker conditions for constrained optimization.

Suggested Readings

1. Chandra, S., Jayadeva, Mehra, A., Numerical Optimization and Applications, Narosa Publishing House, (2013).

2. Taha H.A., Operations Research-An Introduction, PHI (2007).

Recommended **Books:**

1. Pant J. C., Introduction to optimization: Operations Research, Jain Brothers (2004).

2. Bazaarra Mokhtar S., Jarvis John J. and ShiraliHanif D., Linear Programming and Network flows, John Wiley and Sons (1990).

3. Swarup, K., Gupta, P. K., Mammohan, Operations Research, Sultan Chand & Sons, (2010).

4. H.S. Kasana and K.D. Kumar, Introductory Operations research, Springer publication, (2004).

5. Ravindran, D. T. Phillips and James J. Solberg: Operations Research- Principles and Practice, John Wiley & Sons, Second edn. (2005).

SEMESTER-VI

Course Title: Computer Programming Using Python Lab

L	T	P	Cr
0	0	2	1

Course Code: BCS605

Total Hours: 15

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Apply the basic principles of python programming.
2. Create applications using python programming
3. Develop looping functions using python programming.
4. Understand the methods to manipulate python programs by utilizing the data structures like lists.
5. Develop and use Web Services using python

Course Content

List of Programs:

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton‘s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

SEMESTER-VI

Course Title: Java Programming lab
Course Code: BCS606

L	T	P	Cr
0	0	2	1

Total Hours: 15

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Solve the computational problems using basic statements like if-else, control structures, array, and strings.
2. Learn about the user requirements for software functionality in Java programming language.
3. Run a software applications using java programming language
4. Know about basic principles of creating Java applications with Applet programming.
5. Develop a given program using the basic elements like Control and Conditional statements

Course Content

List of Programs:

1. Introduction to JAVA, its features & basic program
2. Write a program for Operators in JAVA
3. 3Write a program to show use of IF-Else Statements in JAVA
4. Write a program use switch case in JAVA
5. Write a program to use looping in JAVA
6. Write a program to use methods in JAVA
7. Write a program to create class and objects
8. Write a program to use Method Overloading and Method Overriding
9. Write a program to use Final Keyword
10. Write a program to show Implementation of Array
11. Write a program to show Implementation of Inheritance
12. Write a program to show creation and use of package
13. Write a program to show use of Interface

14. Write a program to apply replace, concate methods on String 15.Write a program to sort strings of array

15. Write a program to Show Implementation of Threads

16. Write a program to create applet

17. Write a program to create applet with passing parameters

18. Write a program to show use of Exception Handling

19. Write a program to make usage of JAVA lang.awt package and design GUI.

20. Usage of event handling in Java GUI (Graphical user interface) programs.

SEMESTER-VI

Course Title: Artificial Intelligence

Course Code: BCS607

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Design expert system by using AI tools.
2. Compare and develop expert system with the help of Neural Networks
3. Justify expert system using Machine Learning.
4. Restate expert system using Fuzzy Logic.
5. Explain expert system using Deep Learning.

Course Content

UNIT-I **15Hours**

Introduction: What is AI, Importance of AI, and Early work in AI, Applications of AI, Knowledge and its definition? Knowledge Representation: Prepositional logic, FOPL, Properties of Well-formed formulas, Conversion to Clausal form, Inference rules, Resolution principle.

Structured Knowledge: Introduction, Associate frame structures, Conceptual dependencies and scripts.

UNIT-II **15Hours**

Knowledge Organization and Manipulation: Concepts, Uninformed or Blind search, informed search, Searching- And-OR graphs, Pattern Recognition, Recognition Classification process, Classification patterns, Recognizing and understanding speech

UNIT-III **15Hours**

Planning: planning as search, partial order planning, construction and use of planning graphs. Decision-Making: basics of utility theory, decision theory, sequential decision problems, elementary game theory and sample applications.

UNIT-IV **15Hours**

Expert System: Definition, Rule based architecture, dealing with uncertainty, Knowledge acquisition and validation, knowledge system building tools.

Knowledge Acquisition: Types of learning, General Learning model, Performance measures. Learning nearest neighbor, naive Bayes, and decision tree classifiers.

Suggested Readings

1. Dan W. Patterson. (1990). *Introduction to Artificial Intelligence and Expert Systems* .PHI Publication.

2. Peter Jackson. (1998*). Introduction to Expert System.* Addison Wesley.

SEMESTER-VI

Course Title: Advanced Computer Architecture
Course Code: BCS608

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Explain the organization of basic computer, its design and the design of control unit.
2. Provide communicate effectively with a range of audiences
3. Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization.
4. Describe the operations and language f the register transfer, micro operations and input- output organization
5. Apply new knowledge as needed, using appropriate learning strategies.

Course Content

Unit-I **10Hours**

Introduction: Paradigms of parallel computing: Synchronous - vector/array, SIMD, Systolic; Asynchronous- MIMD, reduction paradigm. Hardware taxonomy: Flynn's classifications, Handler's classifications. Software taxonomy: Kung's taxonomy, SPMD.

Unit-II **10Hours**

Abstract parallel computational models: Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one, Sorting network, Interconnection RAMs. Parallelism approaches - data parallelism, control parallelism.

Unit-III **10Hours**

Performance Metrics: Laws governing performance measurements. Metrics - speedups, efficiency, utilization, communication overheads, single/multiple program performances, benchmarks. Parallel Processors: Taxonomy and topology - shared

memory multiprocessors. Distributed memory networks. Processor organization - Static and dynamic interconnections. Embedding and simulations.

Unit-IV **10Hours**

Parallel Programming: Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming. Scheduling and Parallelization: Scheduling parallel programs. Loop scheduling. Parallelization of sequential programs. Parallel programming support environments.

Suggested Readings

1. M. J. Quinn. Parallel Computing: Theory and Practice, McGraw Hill, New York, 1994.

2. T. G. Lewis and H. El-Rewini. Introduction to Parallel Computing, Prentice Hall, New Jersey, 1992

3. T. G. Lewis. Parallel Programming: A Machine-Independent Approach, IEEE Computer Society Press, Los Alamitos, 1994.

4. S.G. Akl, “Design and Analysis of Parallel Algorithms”

5. S.G. Akl, ”Parallel Sorting Algorithm” by Academic Press

SEMESTER-VI

Course Title: Adhoc & Sensor Network

Course Code: BCS609

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Identify the major issues associated with ad-hoc/sensor networks.
2. Explore current ad-hoc/sensor technologies by researching key areas such as algorithms, protocols, hardware, and applications.
3. Gain hands-on experience through real-world programming projects on ad-hoc/sensor hardware.
4. Implement or develop algorithms involved in ad-hoc/sensor systems.
5. Understand data retrieval in sensor networks.

Course Content

UNIT-I **10Hours**

Introduction to Ad Hoc Wireless Networks: Characteristics of MANETs, Applications of MANETs, Challenges. Routing in MANETs: Topology-based versus Position-based approaches, Topology based routing protocols, Position based routing, Other Routing Protocols.

UNIT-II **15Hours**

Data Transmission in MANETs: The Broadcast Storm, Multicasting, Geocasting TCP over Ad Hoc Networks: TCP Protocol overview, TOP and MANETs, Solutions for TOP over Ad Hoc. Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing-

UNIT-III **10Hours**

Basics of Wireless Sensors and Applications: The Mica Mote, Sensing and Communication Range, Design issues, Energy consumption, Clustering of Sensors, Applications. Classification of Transport Layer solutions-TCP over Ad hoc wireless

Networks.

UNIT-IV **10Hours**

Data Retrieval in Sensor Networks: Classification of WSNs, MAC layer, Routing layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

Suggested Readings

1. C Siva Ram Murthy, B.S.Murthy. (2004). *Adhoc Wireless Networks Architectures and Protocols.* Pearson Education.
2. Fei Hu, Xiao Jun Cao, AnAuerbach book, CRC Press. (2010*). Wireless Sensor Networks — Principles and Practice* .Taylor &Francis Group.

SEMESTER-VI

Course Title: Data ware Housing & Data Mining
Course Code: BCS610

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Design and deploy appropriate classification techniques
2. Cluster the high dimensional data for better organization of the data
3. Discover the knowledge imbibed in the high dimensional system
4. Evolve Multidimensional Intelligent model from typical system
5. Evaluate various mining techniques on complex data objects

Course Content

UNIT-1

10 Hours

Need for strategic information, difference between operational and Informational data stores Data warehouse definition, characteristics, Data warehouse role and structure, OLAP Operations, Data mart, Different between data mart and data warehouse, Approaches to build a data warehouse, Building a data warehouse, Metadata & its types.

UNIT-II **10 Hours**

Data Pre-processing: Need, Data Summarization, Methods. De-normalization, Multidimensional data model, Schemas for multidimensional data (Star schema, Snowflake Schema, Fact Constellation Schema, Difference between different schemas. Data warehouse architecture, OLAP servers, Indexing OLAP Data, OLAP query processing, Data cube computation

UNIT-III **10 Hours**

Data Mining: Definition, Data Mining process, Data mining methodology, Data mining tasks, Mining various Data types & issues. Attribute-Oriented Induction, Association rule mining, Frequent itemset mining, The Apriori Algorithm, Mining multilevel association rules.

UNIT-IV **10 Hours**

Overview of classification, Classification process, Decision tree, Decision Tree Induction, Attribute Selection Measures. Overview of classifier's accuracy, Evaluating classifier's accuracy, Techniques for accuracy estimation, increasing the accuracy of classifier. Introduction to Clustering, Types of clusters, Clustering methods, Data visualization & various data visualization tools.

Suggested Readings

1. Data Warehousing, Data Mining & Olap by Berson, Tata McGraw- Hill.

2. Han J., Kamber M. and Pei J., Data mining concepts and techniques, Morgan Kaufmann Publishers (2011) 3rd ed.

3. Pudi V., Krishana P.R., Data Mining, Oxford University press, (2009) 1st ed.

4. Adriaans P., Zantinge D., Data mining, Pearson education press (1996), 1st Ed.

5. Pooniah P., Data Warehousing Fundamentals, Willey interscience Publication, (2001)

SEMESTER-VI

Course Title: Cloud Computing
Course Code: BCS611

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Design Vision, Reference Model, Benefits, Limitations, Open Challenges, Grid and Utility Computing.
2. Demonstrate Service Models, Deployment Models, Cloud Entities, Cloud Clients, and Cloud Programming Models.
3. Describe Cloud Security: Infrastructure Security, Data Security, Identity and Access Management, Privacy Management, Security as a Service on Cloud
4. Resource Provisioning, Bill Management, Multitenancy and Isolation, Service Level Agreement (SLA) and Quality of Service (QoS)
5. Infrastructure Security, Data Security, Identity and Access Management, Privacy Management, Security as a Service on Cloud.

Course Content

UNIT-I **10 Hours**

Cloud Computing: Overview, Applications, Intranet and the Cloud, First Movers on the cloud, the need for Cloud Computing, Benefits of cloud Computing, Limitations of the

Cloud Computing, security concerns and regulatory issues, over view of different cloud computing applications which are implemented, Business case for implementing a Cloud.

UNIT-II **10 Hours**

Cloud computing and Service Models: Public, Private, and Hybrid Clouds, Cloud Ecosystem and Enabling Technologies, Infrastructure-as- a- Service (IaaS), Platform- and Software-as-a-Service (Paas, SaaS). Architectural Design of Compute and Storage

Clouds: A Generic Cloud architecture Design, Layered Cloud Architectural development, Architectural Design Challenges. Cloud Standards: Applications, Client, Infrastructure, Services.

UNIT-III **10 Hours**

Cloud Computing Mechanisms: Software as a service: Overview, Driving Forces, Company offerings, Industries, Software services, Overview Mobile Device Integration, Providers, Microsoft Online Application development, Google, Microsoft, Intuit Quick base, Cast Iron Cloud, Bungee Connect, Development Platforms: Google, Sales Force, Azure, Trouble shooting, Application management

UNIT-IV **10 Hours**

Local Clouds: Virtualization, server solutions, Thin Clients

Migrating to the clouds: Cloud services for individuals, Mid-market, and Enterprise wide, Migration, best practices, analyzing the service.

Suggested Readings

1. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, and ThamaraiSelvi, Tata McGraw Hill, ISBN-13: 978-1-25-902995-0, New Delhi, India, Feb 2013.

2. Cloud Computing Bible, Barrie Sosinsky, Wiley India Pvt. Ltd, ISBN-13: 978- 81-265-2980-3, New Delhi, India, 2011.

3. Cloud Computing: Principles and paradigms, Raj Kumar Buyya, James Broberg, AndrezeiM. Goscinski, Wiley India Pvt. Ltd, ISBN-13: 978-81-265- 4125-6, New Delhi, India, 2011.

REFERENCE BOOKS:

1. Cloud Computing for Dummies, Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Wiley India Pvt. Ltd, ISBN-13: 978-0-47-0597422, New Delhi, India, 2011.

2. Dr. Saurabh Kumar, Cloud Computing: Insights into New-Era Infrastructure, Wiley India Pvt. Ltd, and ISBN-13: 978-8-12-6528837, New Delhi, India, 2011.

SEMESTER-VII

Course Title: Mobile Application Development

Course Code: BCS612

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

Design and develop user Interfaces for the Android platform.
Demonstrate knowledge of mobile ecosystem technologies

Interpret and critically evaluate existing mobile ecosystem solutions for real-world business problems.

Apply an understanding of security, privacy and ethical issues associated with mobile ecosystems.

Save state information across important operating system events.

Course Content

UNIT-I

Introduction: Mobile operating system, Operating system structure, Constraints and Restrictions, Hardware configuration with mobile operating system, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features.

UNIT-II

Introduction to Mobile development IDE's: Introduction to Work light basics, Optimization, pages and fragments , Writing a basic program- in Work light Studio, Client technologies, Client side debugging, Creating adapters, Invoking adapters from Work light Client application, Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding Apache Cordova, Offline access, Encrypted cache deprecated, Using JSON Store

UNIT-III

Understanding Apple iOS development: Android development, Shell Development,

Creating Java ME application, Exploring the Work light Server, Working with UI frameworks, Authentication, Push notification, SMS Notifications, Globalization, Web View overlay , Creating Authentication application: development for Apple iOS by using a login module, Device Analytics, Work light Server Administration

UNIT-IV

Android: Introduction to Android, Architecture, memory management, communication protocols, application development methods, deployment. Case Study: Design and development of Application using mobile application development platforms e.g. Work Light, Kendo, Appcon, Xcode, Xpages Unit VI: iOS: Introduction to iOS, Architecture, memory management, communication protocols, application development methods, deployment. Case Study: Design and development of Application using mobile application development platforms e.g. Work Light, Kendo, Appcon, Xcode, X pages

Suggested Readings

1. Anubhav Pradhan, Anil V Deshpande.(2014). *Mobile Apps Development.* Edition: I

2. Jeff McWherter, Scott Gowell.(2012). *Professional Mobile Application Development*. John Wiley & Sons.

3. Barry Burd.(2015). *Android Application Development All in one for Dummies*. Edition: I

4. SAMS. (2010). *Teach Yourself Android Application Development In 24 Hour.* Edition: I, Publication.

5. Neal Goldstein, Tony Bove.(2011). *IPhone Application Development All-In-One for Dummies*. John Wiley & Sons.

6. Henry Lee, Eugene Chuvyrov.(2012). *Beginning Windows Phone App Development.* Press

7. JochenSchiller.(2004).*Mobile Communications.* Addison-Wesley, 2nd edition,

8. Stojmenovic and Cacute.(2002). *Handbook of Wireless Networks and Mobile Computing*.Wiley, ISBN 0471419028.

SEMESTER-VII

Course Title: Research Methodology

Course Code: BCS701

L	T	P	Cr.
3	1	0	4

Total Hours: 60

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Identify and discuss the role and importance of research in the social sciences.
2. Identify and discuss the issues and concepts salient to the research process.
3. Choose the appropriate research design and develop appropriate research hypothesis for a research project.
4. Discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.
5. Describe the appropriate statistical methods required for a

Course Content

UNIT-I **14 Hours**

Research: Objectives of Research, Research Types, Research Methodology, Research Process – Flow chart, description of various steps, Selection of research problem.

UNIT-II **14 Hours**

Research Design: Meaning, Objectives and Strategies of research, different research designs, important experimental designs, completely randomized, Randomized block, Latin Square, Factorial Experimental Design.

UNIT-III **14 Hours**

Data Collection Methods: Data Collection Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research.

UNIT-IV

18 Hours

Sampling Methods: Different methods of Sampling : Probability Sampling methods , Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling and Multistage Sampling. Non Probability Sampling methods, Sample size. Technical Writing and reporting of research

Types of research report: Dissertation and Thesis, Report Format – Cover page, introductory page, Text, Bibliography, Appendices, Typing instructions, Oral Presentation. Research paper, review article, short communication, conference presentation etc., Referencing and referencing styles, Research Journals, Indexing and citation of Journals, Intellectual property, Plagiarism

Transactional Mode: Video based Teaching**,** Collaborative Teaching**,** Cooperative Teaching**,** Quiz, E-Team Learning.

Suggested Readings

1. C. R. Kothari, GauravGarg.(2004).*Research Methodology Methods and Techniques* .New Age International publishers.
2. Ranjit Kumar. (2005).*Research Methodology: A Step-by-Step Guide for Beginners*. SAGE.
3. Donald Cooper, Pamela Schindler. *(*2006*).Business Research Methods* .McGraw-Hill.
4. Creswell, John W. (2013).*Research design: Qualitative, quantitative, and mixed methods approaches.* Sage publications,

SEMESTER-VII

Course Title: Web Designing & Development

L	T	P	Cr
3	1	0	4

Course Code: BCS702

Total Hours: 60

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Design web pages by JavaScript in HTML
2. Get fundamental skills to maintain web server services required to host a website.
3. Restate scripting languages and web services to transfer data and add interactive components to web pages.
4. Manipulate web media objects using editing software
5. Use CSS in HTML to enhance the quality of web pages.

Course Content

UNIT-I **15 Hours**

Introduction to HTML: HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to JavaScript: Scripts, Objects in Java Script, Dynamic HTML with Java Script XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

UNIT-II **15 Hours**

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties

Persistence, Customizes, Java Beans API, Introduction to EJB's Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, Thejavax .servelet Package, Reading Servelet parameters, and Reading Initialization parameters. The javax .servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues

UNIT-III **15 Hours**

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

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

UNIT-IV **15 Hours**

Database Access: Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework. One android application development.

Suggested Readings

WILEY Dreamtech.(2010). *Web Programming, building internet application*s. Chris Bates 2nd edition.

Hans Bergsten.(2000). *Java Server Pages.* SPDO'Reilly.

Dietel and Nieto.(2001). *Internet and World Wide Web.* PHI/Pearson Education Asia.

JoclSklar.*(2009). Web Warrier guide to web design technologies.* Cengage Learning, New Delhi.

SEMESTER-VII

Course Title: Internet of Things

Course Code: BCS703

L	T	P	Cr
4	0	0	4

Total Hours: 60

Course Outcome: On successful completion of this course, students will be able to:

1. Understand the application areas of IOT.
2. Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
3. Building blocks of Internet of Things and characteristics.
4. Use IOT in real world applications.

Course Content

UNIT-1 **16 Hours**

Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.

UNIT-II **14 Hours**

Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

UNIT-III **15 Hours**

M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function

Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

UNIT-IV **15 Hours**

Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages.

IOT Physical Devices & Endpoints: Introduction to IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming & IOT Devices.

Suggested Readings

1. Vijay Madisetti, Arshdeep Bahga," Internet of Things A Hands-On-Approach",2014, ISBN:978 0996025515
2. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN: 978-1-118-43062-0
3. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN 0989973700
4. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014. 2. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.

SEMESTER-VII

Course Title: Block Chain Architecture Design

Course Code: BCS704

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Outcome: On successful completion of this course, students will be able to:

1. Describe the basic concepts and technology used for block chain.
2. Describe the primitives of the distributed computing and cryptography related to block chain.
3. Apply security features in block chain technologies.
4. Use smart contract in real world applications.

Course Content

UNIT-1 **16 Hours**

Introduction to Block chain: Digital Money to Distributed Ledgers, Design Primitives: Protocols, Security, Consensus, Permissions, Privacy. Blockchain Architecture and Design: Basic crypto primitives: Hash, Signature,) Hashchain to Blockchain, Basic consensus mechanisms

UNIT-II **14 Hours**

Consensus: Requirements for the consensus protocols, Proof of Work (PoW), Scalability aspects of Blockchain consensus protocols Permissioned Blockchain Design goals, Consensus protocols for Permissioned Blockchain.

UNIT-III **15 Hours**

Hyper ledger Fabric (A): Decomposing the consensus process, Hyperledger fabric components, Chain code Design and Implementation

Hyperledger Fabric (B): Beyond Chaincode: fabric SDK and Front End (b) Hyperledger composer tool

UNIT-IV **15 Hours**

Use case 1: Blockchain in Financial Software and Systems (FSS): (i) Settlements, (ii) KYC, (iii) Capital markets, (iv) Insurance

Use case 2: Blockchain in trade/supply chain: (i) Provenance of goods, visibility, trade/supply chain finance, invoice management discounting, etc 08 V

Use case 3: Blockchain for Government: (i) Digital identity, land records and other kinds of record keeping between government entities, (ii) public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain

Suggested Readings

1. Narayanan, Bonneau, Felten, Miller and Goldfeder, “Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction”, Princeton University Press.
2. Josh Thompson, ‘Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming’, Create Space Independent Publishing Platform, 2017.
3. Imran Bashir, “Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained”, Packt Publishing.
4. Merunas Grincalaitis, “Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Protocols”, Packt Publishing.

SEMESTER-VII

Course Title: Web Designing& Development Lab

L	T	P	Cr
0	0	2	1

Course Code: BCS705

Total Hours: 15

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Develop a dynamic webpage by the use of java script.
2. Connect a java program to a DBMS.
3. Design a well formed and valid and XML and DHTML document.
4. Examine a server side java application called Servlet to update and delete operations on DBMS table.
5. Design a page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page.

Course Content

1. Create a basic web page to show use of head, title, and body tag.
2. Create a web page to show use heading and text formatting tags.
3. Create a web page to show use img, ul, Oland anchors.
4. Create a web page to show use tables and divtags.
5. Create a web page using class, id and inline styles.
6. Create a web page to create a form.
7. Create a web page to show an alert using JavaScript.
8. Show the use of get Element by Id in JavaScript.
9. Create a web page using variables, loop and Conditions in JavaScript.
10. Create a web page using Switch in JavaScript.
11. Create a web page to show use of jQuery.
12. Create a web page to implement get & post in Ajax.

13. Create a web page to print your name usingPHP.
14. Create a web page to show use of all data types inPHP
15. Create a web page to show use loops &Conditional Statement.
16. Create a web page to show use arrays inPHP.

SEMESTER-VII

Course Title: Project I

Course Code: BCS706

L	T	P	Cr
0	0	2	4

Total Hours: 15

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Use latest multimedia devices and programming software.
2. Design and construct a hardware and software system, component or process to meet desired needs.
3. Do work on multidisciplinary Problems.
4. Work as professionals, with portfolio ranging from data management, network configuration, designing hardware, database and software design to management and administration of entire systems.

Course Content

1. Project should include following phases: System Analysis and Design
2. Coding - Implementation Testing
3. It should be a working project Must have a future perspective
4. The Domain of project can be from: Databases

5. Application software

6. System software
7. Multimedia
8. Web Applications, etc.

A complete project report must be submitted along with softcopy of project. Project report may include Requirements of Project, Flow Chart, DFD's, Coding and Test Results

SEMESTER-VII

Course Title: Natural Language Processing

Course Code: BCS707

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Apply the computational knowledge for Natural Language Processing to understand the properties of natural languages, its algorithms for processing linguistic information in various tasks such as Machine translation, Information extraction and retrieval, and Speech Technology.

2. Understand the concepts of linguistic foundations that underlie natural language processing, which would provide the knowledge for building components of NLP systems.

3. Discover the capabilities, analyze them and explore the limitations of current natural language technologies, and some of the algorithms and techniques that underline these technologies to take up various research challenges in the field.

4. Recognize the significance of research in natural language processing for common NLP tasks such as text classification, spam filtering, spell checking, machine learning, etc. to engage in lifelong learning.

Course Content

UNIT-1 **16 Hours**

Introduction: Basic concepts of Natural language Processing, evolution of NLP, issues and challenges in NLP, basic concepts of phases of natural language processing mor-phological analysis, syntactic analysis, semantic analysis, pragmatic analysis, tools and techniques used for performing these analysis, ambiguities, Types of ambiguities

UNIT-II **14 Hours**

Syntactic analysis: Concept of Grammars, Chomsky hierarchy of grammars, concept of parsing, top down parsing, bottom up parsing, bidirectional parsing, generating parse tree, data structures and algorithms used for parsing, tokeniser Case study of parsers of NLP systems like ELIZA, LUNAR

UNIT-III **15 Hours**

Semantic Analysis : understanding meaning, CASE grammars, transformational gram-mars used for performing semantic analysis. Resolving ambiguities to generate correct meaning, Word Sense Disambiguation Case study of Toolkit of word sense disambiguation used in WORDNET

UNIT-IV **15 Hours**

Software tools for Performing NLP: English WORDNET, components of WorldNet understanding NLTK tool for using wordnet, HINDI wordnet, Indian Govt initiative for language analysis and machine translation

Suggested Reading

1. Allen,James, “Natural Language Understanding”, Second Edition, Benjamin/ Cum-ming, 1995.

2. Jurafsky, Danand Martin, James,” Speech and Language Processing”, Second Edition, Prentice Hall,2008

3. Ela Kumar, “ Natural Language Processing”, IK international Publication, second edition 2014

4. Bharati Akshar, Chaitanya Vineet, Sangal, Rajeev, “Natural Language Processing: A Paninian Perspective”, Prentice Hall India Learning Private Limited; EASTERN ECONOMY ed. edition , 1995

SEMESTER-VII

Course Title: Design &Development of Applications

Course Code: BCS708

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Outcome: On successful completion of this course, students will be able to:

1. Learn the basics of learning problems with hypothesis and version spaces
2. Understand the features of machine learning to apply on real world problems
3. Characterize the machine learning algorithms as supervised learning and unsupervised learning and Apply and analyze the various algorithms of supervised and unsupervised learning
4. Analyze the concept of neural networks for learning linear and non-linear activation functions

Course Content

UNIT-1 **10 Hours**

Introduction: Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT-II **10 Hours**

Basic Design: Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability

UNIT-III **15 Hours**

Advanced Design: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

Technology Android: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wi-Fi – Integration with social media applications.

UNIT-IV **10 Hours**

IOS: Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wi-Fi - iPhone marketplace. Swift: Introduction to Swift, features of swift**.**

Suggested Reading

1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012

2. AnubhavPradhan , Anil V Despande Composing Mobile Apps,Learn ,explore,apply

3. James Dovey and Ash Furrow, “Beginning Objective C”, Apress, 2012

4. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

5. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6. Development: Exploring the iOS SDK”, Apress, 2013.

SEMESTER-VII

Course Title: Wireless Communication

Course Code: BCS709

L	T	P	Cr
3	0	0	3

Total Hours: 45

Course Outcome: On successful completion of this course, students will be able to:

1. To List the different modes of communication and explain the evolution of different mobile communication technologies
2. Summarize the challenges of wireless transmission and different design models.
3. To illustrate the working of a cellular network and ***discuss*** issues related to cellular network design.
4. To illustrate different digital modulation and noise handling techniques used in Wireless Communication

Course Content

UNIT-1 **16 Hours**

Introduction To Wireless Communication Systems: Evolution of mobile radio communications; examples of wireless comm. systems; paging systems; Cordless telephone systems; overview of generations of cellular systems, comparison of various wireless systems. Introduction to Personal Communication Services (PCS): PCS architecture, Mobility management, Networks signaling. A basic cellular system, multiple access techniques: FDMA, TDMA, CDMA. Introduction to Wireless Channels and Diversity: Fast Fading Wireless Channel Modeling, Rayleigh/Ricean Fading Channels, BER Performance in Fading Channels, Introduction to Diversity modeling for Wireless Communications

UNIT-II **14 Hours**

2G Networks: Second generation, digital, wireless systems: GSM, IS_136 (D-AMPS), IS-95 CDMA. Global system for Mobile Communication (GSM) system overview: GSM Architecture, Mobility Management, Network signaling, mobile management, voice signal processing and coding. Spread Spectrum Systems- Cellular code Division Access Systems-Principle, Power Control, effects of multipath propagation on code division multiple access.

UNIT-III **10 Hours**

2.5G Mobile Data Networks: Introduction to Mobile Data Networks, General Packet Radio Services (GPRS): GPRS architecture, GPRS Network nodes, EDGE, Wireless LANs, (IEEE 802.11), Mobile IP. Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G, Introduction to 4G.

UNIT-IV **15 Hours**

Wireless Local Loop (WLL): Introduction to WLL architecture, WLL technologies. Wireless personal area networks (WPAN): Blue tooth, IEEE 802.15, architecture, protocol stack. Wi-Max, introduction to Mobile Adhoc Networks. Global Mobile Satellite Systems, Case studies of IRIDIUM and GLOBALSTAR systems.

Suggested Reading

1. Raj Pandya, “Mobile & Personnel communication Systems and Services”, Prentice Hall India, 2001.
2. Theodore S. Rappaport, “Wireless Communication- Principles and practices,” 2nd Ed., Pearson Education Pvt. Ltd, 5th Edition, 2008.
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4. Jochen Schiller, “Mobile communications,” Pearson Education Pvt. Ltd., 2002.
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6. Lee, W.C.Y., “Mobile Cellular Telecommunication”, 2nd Edition, McGraw Hill,1998.
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SEMESTER-VIII

Course Title: Industrial Training

Course Code: BCS801

L	T	P	Cr
0	0	0	20

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. The capability to create, analyze and critically evaluate different technical/architectural solutions.
2. A consciousness of the ethical aspects of research and development work.
3. The capability to create, analyze and critically evaluate different technical/architectural solutions.
4. The capability to critically and systematically integrate knowledge.

Course Content

The industrial training will normally contain:

- An account of the process of obtaining the data required for the industrial training projects and the results obtained; relationship to other research, and any methodological or theoretical implications;
- The relationship of the findings to existing professional understanding and, where
- Appropriate, potential implementation difficulties.
- It is not intended to restrict students to a precisely defined format for the dissertation but it
- Should follow the standard practices of dissertation writing. Although a written report will
- Normally be expected, it should be accompanied by soft copy on CD.