GALGOTIAS UNIVERSITY

Syllabus of

Course Book B.Tech. (CSE) 2018-19

Name of School: School of Computing Science and Engineering

Department: Computer Science and Engineering

Year: 2018-19

School of Computing Science and Engineering

Program: B. Tech Computer Science and Engineering

Scheme: 2018 – 2022

Curriculum

Year :	Ist	2018-22 batch (1st Sem)				
S.No.	Course Code	Name of the Course	Teaching Scheme			Credits
			L	T	P	
1	MATH1005	Calculus	3	0	0	3
2	BTME1003	Product Manufacturing	0	0	2	1
3	CHEM1001	Engineering Chemistry	3	0	0	3
4	PHYS1001	Engineering Physics	3	0	0	3
5	UHVE1001/PSSO1001	Universal Human Values /Psychology & Sociology	0	0	4	2
6	GERM1001	Germen-I	0	0	2	1
Practical						
1	MATH1007	Exploration with CAS-I	0	0	2	1
2	SLBT1011	English Proficiency and Aptitude Building-1	0	0	4	2
3	BCSE1001	Introduction to Computer Science and Engineering 0-0-2(1)	0	0	2	1
4	BCSE1002	Computer Programming and Problem Solving	0	0	4	2
5	CHEM1002	Engineering Chemistry	0	0	2	1
6	PHYS1002	Engineering Physics	0	0	2	1
		TOTAL	9	0	24	21

Year :	Ist	2018-22 batch (2nd Sem)				
S.No.	Course Code	Name of the Course	Teaching Scheme			Credits
			L	T	P	
1	MATH1006	Linear Algebra and Differential Equation	3	0	0	3
2	BTME1002	Product Design Using Graphics	0	0	4	2
3	ENVS1001	Environmental Science	3	0	0	3
4	BEEE1002	Basic Electrical and Electronic Engineering	3	0	0	3
5	UHVE1001/PSSO1001	Universal Human Values /Psychology & Sociology	0	0	4	2
6	GERN1002	Germen-II	0	0	2	1
Practical						
1	MATH1008	Exploration with CAS-II	0	0	2	1
2	SLBT1012	English Profiency and Aptitude Building -II	0	0	4	2
3	BCSE1003	Application Oriented Programming Using Python	0	0	4	2
4	BEEE1003	Basic Electrical and Electronic Engineering-Lab	0	0	2	1
		TOTAL	9	0	22	20

Year :	2nd	2018-22 batch (3rd Sem)				
S.No.	Course Code	Name of the Course	Teaching Scheme			Credits
			L	T	P	
1	MATH2007	Discrete Structure	3	1	0	4
2	BCSE-2330	Introduction to cryptographic Fundamentals	3	0	0	3
3	BCSE-2320	Data Structure Using C++	3	0	0	3
4	BCSE-2310	Digital Design and Computer Architecture	3	0	0	3
5	BTME-2002	Engineering Thermodynamics	3	0	0	3
6	BCSE-2340	Theory of Automata & Formal Language	3	0	0	3
Practical						
1	BCSE-2331	Introduction to cryptographic Fundamentals-Lab	0	0	2	1
2	SLBT-2021	English Profiency and Aptitude Building -III	0	0	4	2
3	BCSE-2321	Data Structure Using C++-lab	0	0	2	1
4	BCSE-2311	Digital Design and Computer Architecture-Lab	0	0	2	1
5	BCSE-2071	Industry Oriented Python-1	0	0	2	1
6	BCSE-2072	Industry Oriented Java-1	0	0	2	1
		TOTAL	18	1	14	26

Year :	2nd	2018-22 batch (4th Sem)				
S.No.	Course Code	Name of the Course	Teaching Scheme			Credits
			L	T	P	
1	MATH2003	Probability& Statistics	3	0	0	3
2	BCSE2010	Operating System	2	0	2	3
3	BCSE2011	Data management System	2	0	2	3
4	BCSE3029	AI&ML Using Python	3	0	0	3
5	BCSE2012	Data Communication & Networking	3	0	0	3
6	BCSE9009	Transducer Sensor & Embedded System	3	0	0	3
Practical						
1	SLBT2022	English Profiency and Aptitude Building -4	0	0	4	2
2	BCSE3072	Industry Oriented Python-2	0	0	2	1
3	BCSE3071	Industry Oriented Java-2	0	0	2	1
		Total	16	0	12	22

Year :	3rd	2018-22 batch (5th Sem)				
Subject Code		Name of the Course	Teaching Scheme			Credits
			L	T	P	
1	BCSE3031	Design & Analysis of Algorithms	3	0	0	3
2	BCSE3032	Software Engineering & Testing Methodologies	2	0	4	4
3	BCSE3069	Computer Graphics	2	0	2	3
Programme Elective -III						
Elective-II:4	BCSE3051	Microprocessor & Interfacing	2	0	2	3
	BCSE3092	Data Sciences	2	0	2	3
	BCSE3093	Machine Learning	2	0	2	3
	BCSE3094	Data Mining and Warehousing	2	0	2	3
	BCSE3087	Information Theory and Coding Techniques	2	0	2	3
Programme Elective -IV						
Elective -III :5	BCSE3096	Cloud Application Development	2	0	2	3
	BCSE3097	Adhoc & Sensors Netwoks	2	0	2	3
	BCSE3086	Statistical Analysis using R	2	0	2	3
	BCSE3099	Block Chain Technology	2	0	2	3
	BCSE3088	Software Defined Network	2	0	2	3
Practical/Training						
6	BCSE3073	Programming Skills-1/ Industry Oriented Python-III/	0	0	2	1
7	BCSE3074	Programming Skills-1/ Industry Oriented Java-III/	0	0	2	1
8	BCSE3075	Minor Project	0	0	0	3
9	SLBT3031	English Profiency and Aptitude Building -4	0	0	4	2
10	BCSE3076	Industrial/Summer Training -II	0	0	0	4
TOTAL			11	0	18	27

Year :	3rd	2018-22 batch (6th Sem)				
S.No.	Course Code	Name of the Course	Teaching Scheme			Credits
			L	T	P	
1	BTCS3601	Web Technology	2	0	2	3
2	BTCS3602	Compiler Design	3	0	0	3
Programme Elective -V						
Elective-II:4	BTCS9502	Object Oriented Analysis & Design	2	0	2	3
	BTCS9503	Software Project Management	2	0	2	3
	BTCS9504	Network Operating System	2	0	2	3
	BTCS9505	Robotics Process automation	2	0	2	3
University Elective -I						
Elective -III :5	BTCS8101	Enterpreneurship	3	0	0	3
	BTCS8102	Project Management	3	0	0	3
	BTCS8103	Managerial Economics	3	0	0	3
	BTCS8104	Equity & Portfolio Management	3	0	0	3
Practical/Training						
6	BTCS3651	Industry Oriented Python-IV	0	0	2	1
7	BTCS3652	Industry Oriented Java-IV	0	0	2	1
8	SLBT3002	Campus to Corporate	0	0	4	2
		Self Study & Research	0	0	0	1
9	BTCS3653	Project-II	0	0	0	2
TOTAL			10	0	12	19

Year :	4th	2018-22 batch (7th Sem)				
S.No.	Course Code	Name of the Course	Teaching Scheme			Credits
			L	T	P	
Programme Elective -VI						
		E-Commerce	3	0	2	4
		Advanced Computer Networks	3	0	2	4
		Enterprise Resource Planning	3	0	2	4
		Deep Learning	3	0	2	4
1		UI&UX	3	0	2	4
Practical						
2		Capstone Design -1	0	0	12	6
University Elective -II						
		Banking system	3	0	0	3
		Corporate Laws and Policy	3	0	0	3
3		Export and Import Policy	3	0	0	3
		Total	24	0	22	13

Year :	4th	2018-22 batch (8th Sem)				
S.No.	Course Code	Name of the Course	Teaching Scheme			Credits
			L	T	P	
		Capstone Design -Phase-II	0	0	12	6
		Industrial Internship	0	0	4	2

Detailed Syllabus

Semester I

Name of the Course	Calculus			
Course Code	MATH1005			
Prerequisite				
Co requisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objective

To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems. To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.

Course Outcome

CO1	Explain the convergence of a series and Summarize some important series expansions of a single variable function.
CO2	Explain some of the fundamental theorems of differential calculus and Utilize them for some of the applications.
CO3	Explain improper integrals and Utilize it to develop two special functions.
CO4	Explain the methods of finding derivatives and integrals of multivariable scalar functions and apply it to solve the problems of optimization, and finding areas and volumes.
CO5	Explain the three elements of vector differential calculus, construct the methods for evaluation of integrals of vector valued functions and make use of the three important theorems to solve the problems of integrations.

Text Book (s)

Robert T. Smith and Roland B. Minton, Calculus, 4th Edition, McGraw Hill Education.

George B. Thomas and Ross L. Finney, Calculus, 9th Edition, Pearson Education

Reference Book (s)

R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 4th Edition, Narosa publishers.

Michael D. Greenberg, Advanced Engineering Mathematics, 2nd Edition, Pearson Education

Unit-1: Sequences and series 8 hours

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. Harmonic analysis.

Unit-2: Differential Calculus (Single Variable): 8 Hours

Evolutes and involutes, Rolle's Theorem, Mean value theorems, Taylor's theorem with remainders; indeterminate forms and , Evaluation of definite and improper integrals; Beta and Gamma functions and their properties.

Unit-3: Differential Calculus(Multivariable): 9 Hours

Functions of several variables, Limits and continuity, Partial derivatives, Total differential, Derivatives of composite and implicit functions, Extreme values and saddle points, Lagrange's method of undetermined multipliers.

Unit-4: Multiple Integrals: 10 Hours

Double integrals in Cartesian and Polar coordinates, Change of order of integration, change of variables (Cartesian to polar), Applications of double integrals to find area and volume, Triple integrals in Cartesian, Change of variables in triple integrals(cylindrical and spherical coordinates), Aapplications of triple integral.

Unit-5: Vector Calculus: 10 Hours

Scalar and vector fields, Differentiation of Vector functions, Gradient, divergence, curl and their physical interpretations, line integrals, path independence, potential functions and conservative fields, surface integrals, Green's theorem, Stokes's theorem and Gauss's divergence theorems (without proof).

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**PRODUCT MANUFACTURING**			
Course Code	**BTME-1003**			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives

The focus of Product Design and Development is integration of the marketing, design, and manufacturing functions of the firm in creating a new product. The course is intended to provide you with the following benefits:

Competence with a set of tools and methods for product design and development.

Confidence in your own abilities to create a new product.

Awareness of the role of multiple functions in creating a new product (e.g. marketing, finance, industrial design, engineering, production).

Ability to coordinate multiple, interdisciplinary tasks in order to achieve a common objective.

Reinforcement of specific knowledge from other courses through practice and reflection in an action-oriented setting.

Enhanced team working skills.

Course Outcomes

CO1	Develop a product using Welding Process.
CO2	Develop a product out of a given sheet.
CO3	Assemble a product of wood in carpentry shop.
CO4	Create a product using casting and then machining.
CO5	Assemble different components to get final product with the help of welding.

Text Book (s)

1. Product Manufacturing Manualprepared by faculties of School of Mechanical Engineering.

Reference Book (s)

A.K. Hajra Choudhury, S.K. Hajra Choudhury and Nirjhar Roy (2009), Elements of Workshop Technology, Vol. – I, Media Promoters, ISBN: 978-8-185-09914-9.

A.K. Hajra Choudhury, S.K. Hajra Choudhury and Nirjhar Roy (2010), Elements of Workshop Technology, Vol. – II, Media Promoters, ISBN: 978-8-185-09915-6.

Course Content

S. No	List of Experiment
1	To prepare a given product using the knowledge gained in Product Manufacturing Lab while working in the lab. (To be submitted at the end of the session and evaluated in the external examination)
2	**Welding Shop** Any two of the following Prepare a Lap joint as per drawing using Oxy-Acetylene Gas welding. Prepare a T-joint as per drawing using Oxy-Acetylene Gas welding. Prepare a Butt-joint as per drawing using Oxy-Acetylene Gas welding. Prepare L- joint as per drawing using Oxy-Acetylene Gas welding. Prepare a Lap joint as per drawing using Electric Arc welding. Prepare a T-joint as per drawing using Electric Arc welding. Prepare a Butt-joint as per drawing using Electric Arc welding. Prepare L- joint as per drawing using Electric Arc welding.
3	**Fitting Shop** Prepare a Male/Female Parts as per drawing
4	**Lathe Machine Shop** Preparation of Job as per drawing.
5	**Sheet metal Shop** Preparation of funnel of given dimension. Use soldering to join lower part with upper and use riveting to join cylinder.
6	**Foundry Shop** Preparation of Job of aluminum as per drawing through casting.
7	**Black Smithy Shop** Any one of the following Preparation of S shaped hook of given drawing of MS rod. Making of chisel of given drawing of MS rod. Making of a wheel of given drawing of MS rod.

8	**Carpentry Shop** Any one of the following Preparation of T-Joint of given dimension. Preparation of Lap Joint of given dimension. Preparation of Cross Joint of given dimension. Preparation of Dove Tail Joint of given dimension

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of the Course	Engineering Chemistry				
Course Code	CHEM1001				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objective

To make the students conversant with basics of polymer chemistry.

To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.

To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.

To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

To acquaint the students with the basics of nano materials, their properties and applications.

Course Outcome

CO1	Describe the atomic structure and trends in modern periodic table.
CO2	Determine the properties and shape of molecules by various theories of chemical bonding.
CO3	Differentiate nuclear reactions and apply nuclear chemistry to calculate age of samples.
CO4	Demonstrate the concepts of thermodynamics and chemical kinetics.
CO5	Explain the structure and properties of biomolecules and describe the photochemical reactions.

Text Book (s)

Darrell *Ebbing*, Steven *Gammon, General Chemistry*, Cengage Learning, *2012, ISBN* 978-1-285-05137- 6, *10th Edition*

William R. *Robinson*, Jerome D. *Odom*, Henry Fuller *Holtzclaw*. General Chemistry, Houghton Mifflin Harcourt Publishing Company, 1996, Edition 10, ISBN 066935483X, 9780669354836.

ArunBahl, B. S. Bahl and G.D. Tuli, Essential of Physical Chemistry, S. Chand and Company Ltd., New Delhi, 2009, ISBN 81-219-2978-4, Ed 2009.

M. Siberberg, The Molecular Nature of Matter and Change, McGraw-Hill Education; 7 *edition, 2014, ISBN*-10: 0021442541

Reference Book (s)

T.W. Graham Solomons and Craig Fryhle, Organic Chemistry, John Wiley and Sons, Inc., 2011, ISBN: 0470556597, 10th Ed.

Julio De Paula, Peter Atkins, Physical Chemistry, Oxford University Press, 2011, ISBN-13: 9780199599592

Lehninger, Principles of Biochemistry [David L. Nelson, Michael M. Cox] on W H Freeman & Co., February 1, 2008, | ISBN-10: 071677108X | ISBN-13: 978-0716771081 | Edition: 5th.

Mehrotra R. C, Singh Anirudh Organometallic Chemistry: a unified approach, New Age International, New Delhi, 2007, ISBN: 9788122412581.

J. House, Inorganic Chemistry, Imprint Academic Press, 2012, ISBN 9780123851109

Unit-1: Introduction to Atomic Structure 12 hours

Structure of the Atom, Introduction to Periodic Table, Evolution of Atomic Theory, Thomson's plum pudding model, Rutherford's model and Rutherford-Geiger-Marsden Experiment, Black body radiation; Planck-Einstein Relationship, Planck's constant; Bohr's Model; Bohr's postulates; Matter-Energy interactions involving hydrogen atom; Rydberg Equation; Bohr-Sommerfield Model; Hydrogen Spectral Series (Balmer Series); Wave- Particle duality (de-Broglie's rule); Heisenberg's Uncertainty Principle; Quantum-Mechanical Model of the Atom; Quantum numbers; s, p, d, f, orbitals; Stern-Gerlach Experiment; Aufbau Principle; Pauli's Exclusion Principle; Hund's Rule; Electronic configuration based on Quantum States.

Unit-2: Introduction to Chemical Bonding 9 Hours

Covalent Bond; sigma and pi bond; single, double and triple bonds; Ionic Bond; Octet stability; Lewis dot structure ; VSEPR Theory; LCAO-MO; H2; CO; Valence Bond Theory; Periodic trends of chemical properties; Inter-molecular and Intra-molecular bonding (Hydrogen Bonding, Van Der Waals forces, London Forces, etc); dipole moment; polarizibility of molecules; Metallic bonding. Band theory of solids; conductors; semiconductors; insulators.

Unit-3: Nuclear Chemistry 6 Hours

Nuclear Fission, Nuclear Fusion, Half Life, Mass Defect, Astro-chemistry (Reactions in Stars, Mechanism of decay of Stars); Carbon Dating, Related Numerical.

Unit-4: Thermodynamics and Chemical Kinetics 6 Hours

First Law, Second Law, Third Law and Zeroeth Law of Thermodynamics, Enthalpy, Entropy, Gibbs Free Energy, First, second and zero order reactions; Arrhenius Equation

Unit-5: Photochemistry and Biochemistry 8 Hours

Introduction to Photochemistry; Photochemical reactions of organic molecules (Electrocyclic reactions, Norrish reactions; photoisomerization, Zimmerman's Rearrangement), Introduction to Carbohydrates, Lipids and Proteins. DNA structure.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of the Course	Engineering Physics				
Course Code	PHYS1001				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objective

To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

Course Outcome

CO1	Distinguish Classical and quantum physics and solve Schrodinger wave equations
CO2	Illustrate the phenomenon of Interference and Diffraction of light
CO3	Discuss the principle, components and working of Laser
CO4	Describe Maxwell's equations and their significance in electromagnetics
CO5	Categorize the magnetic materials.

Text Book (s)

Arthur Beiser, S RaiChoudhury, ShobhitMahajan, (2009), Concepts of Modern Physics, 6th Edition, Tata-McGraw Hill. ISBN-9780070151550.

Dr. N. Subrahmanyam, BrijLal and Dr. M. N. Avadhanulu (2010) A Text book of Optics, 24th Edition, S. Chand Higher Academy. ISBN 8121926114

B.K Pandey and S. Chaturvedi (2012) Engineering Physics, Cengage Learning, ISBN 9788131517611

Reference Book (s)

Robert Kolenkow, David Kleppner (2007), An Introduction to Mechanics, 1st Edition, Tata-McGraw Hill.

B.B. Laud, Lasers and Non-Linear Optics (2011), 3rd Edition, New Ages International.

William Silfvast (2002), Laser Fundamentals, Cambridge University Press.

David. J. Griffiths (2009), Introduction to Electrodynamics, 3rd Edition, PHI Learning.

Unit-1: Quantum Mechanics 8 hours

Wave-Particle duality, de-Broglie waves, Davisson & Germer Experiment (Experimental verification of de-Broglie waves), Heisenberg Uncertainty Principle and its Applications, Schrodinger's wave equations, Particle in a Box.

Unit-2: Optics 8 Hours

Interference- Interference of Light, Bi-prism experiment, interference in thin films, Newton's rings; Diffraction-Single slit, Diffraction grating, Grating spectra, Rayleigh's criterion and resolving power of grating.

Unit-3: LASER 8 Hours

Einstein's coefficients, Population Inversion, Three level and four level laser, Laser characteristics, He-Ne laser and applications.

Unit-4: Electromagnetics 8 Hours

Displacement current, Maxwell's Equations (Integral and Differential form), Equation of continuity, EM-Wave equations and its propagation characteristics in free space, Poynting theorem and Poynting vectors.

Unit-5: Magnetism 8 Hours

Origin of magnetization, Orbital and spin magnetic moment, Classification and properties of magnetic materials, Hysteresis curve, soft and hard magnetic materials.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of the Course	UNIVERSAL HUMAN VALUES			
Course Code	UHVE1001			
Prerequisite				
Co-requisite				
Anti-requisite				
L	T	P	C	
0	0	4	2	

Course Objectives

To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.

To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession

To help students understand the meaning of happiness and prosperity for a human being.

To facilitate the students to understand harmony at all the levels of human living, and live accordingly.

To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcomes

CO1	Understand the significance of value inputs in a classroom and start applying them in their life and profession
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO3	Understand the value of harmonious relationship based on trust and respect in their life and profession
CO4	Understand the role of a human being in ensuring harmony in society and nature.
CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Text Book (s)

R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Reference Book (s)

Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA

E. F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.

Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991

Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.

A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.

P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.

A N Tripathy, 2003, Human Values, New Age International Publishers.

SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.

E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press

M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.

B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Course Content

Module I: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education
Understanding the need, basic guidelines, content and process for Value Education Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels
Module II: Understanding Harmony in the Human Being - Harmony in Myself
Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Swasthya
Module III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship
Understanding harmony in the Family- the basic unit of human interaction Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship Understanding the meaning of *Vishwas*; Difference between intention and competence Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!
Module IV: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence
Understanding the harmony in the Nature Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature

Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space Holistic perception of harmony at all levels of existence
Module V: Implications of the above Holistic Understanding of Harmony on Professional Ethics
Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in Professional Ethics: Ability to utilize the professional competence for augmenting universal human order Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers At the level of society: as mutually enriching institutions and organizations

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

HUM201	**Psychology & Sociology**	L 0	T 0	P 4	C 2
Version No.	1.0				
Prerequisite	-				
Objectives:	To teach students how to describe human behavior using appropriateconcepts To enable the students understand the contributions made by eminent thinkers and researchers to the pool of knowledge in the field To make students realize the relevance of Sociology and Psychology inthe context of the present day organizations				
Expected Outcome:	Student will be able to To become aware of the causes and consequences of Social and Psychological problems To be able to understand the impact of social environment onindividuals and groups To be able to utilize the knowledge of Sociology and Psychology toimprove the quality of living of self and of people in general				

Module I Psychology Introduction		
Definition and Scope of Psychology; Psychology as a science. Personality: Definition,types of personality, Measurement of Personality. Type 'A' Personality, Anger scale, well-being scales. Behavior Modification: Perception, Motivation, and Learning,Relaxation Techniques, Assertive Training, and Desensitization Procedures.		
Module II	Applications	
Application of Psychology: Industry: Selection, Training, motivation and Productivity, Team building, Stress-management. Marketing: Consumer Behavior and Advertising; Self-Development: Application of Psychology in building memory and creativity.		
Module III	Sociology – Introduction	
Sociology: Definition and nature; Society and Social Processes:- Competition,cooperation and conflict, Social groups – Types and characteristics; Social Institutions: Marriage: and family: and their impact on individuals; Functions and dysfunctions ofreligion		
Module IV	Social concerns	
Major Social Concerns: Social Stratification: Nature and types, Prejudices Social Mobility, Types, facilitating and hindering factors. Social Changes:- Urbanization, westernization, and pluralism; Demographic variables – Fertility, mortality, Sex-ratio, literacy, Life-expectancy. Social Problems:- Crime, Social unrest, Beggary. Alcoholism and substance abuse, Prostitution, Gender injustice and child Abuse. Social Movements:- Sarvodaya, Bhoodan, Chipco, Dravidian and the Dalit Movements.		
References		
Grace Davie: Sociology of Religion, Sage Publications 2007 Sharmila Rege: Sociology of Gender, Sage Publications 2003 Meena Hariharan and Radhanath Rath: Coping With Life Stress, Sage Publications2008 Robbins Stephen: Organizational Behavior, P. Prentice Hall International, Inc. Eaglewood Cliffs, 2002		
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination	
Recommended by the Board of Studies on:		
Date of Approval by the Academic Council:		

Practical Sem 1

Name of the Course	Exploration with CAS-I				
Course Code	MATH1007				
Prerequisite					
Corequisite					
Antirequisite					
	L	T	P	C	
	0	0	2	1	

Course Objective

Open source software tools like Scilab also demands an open and free learning resource. LearnCAx brings to you a free course which will introduce you to the basics of programming using Scilab along with examples and supporting material. Register now if you are curious about Scilab and want to get started with programming in Scilab.

Course Outcome

CO1	Describe **the SCILAB code for solving mathematical problem and** utilize **different function loops (if else, while , for) in SCILAB code.**
CO2	Write a SCILAB code of matrix with different operations and find a inverse & transpose of a matrix.
CO3	Write a SCILAB code for plotting a graph of 2 dimensional & 3 dimensional figures.
CO4	Write a SCILAB code of expansion of function in Taylor's series & Fourier Series with different wave forms.
CO5	Write a SCILAB code for computing double and triple integrals in Cartesian coordinates and identifying the critical points of 2-D and 3-D. surface.

1. Introduction to Scilab and Basic syntax, Mathematical Operators, Predefined constants, Built in functions at SCILAB platform.
2. SCILAB -CODE for find addition, subtraction, multiplication and division of two matrices , transpose of a matrix and inverse of a non singular matrix.
3. SCILAB -CODE for programming -Functions - Loops - Conditional statements - Handling .sci files.
4. SCILAB -CODE for 2-D : circle, parabola, ellipse and hyperbola and 3-D surfaces: Planes, Sphere, Cylinder, Parabolioid, Ellipsoid, Hyperboloid, cone.
5. SCILAB -CODE to find expansion of functions in Taylor series.
6. SCILAB -CODE for Fourier series expansion of different wave forms and comparison with the original function.
7. SCILAB -CODE for identifying the critical points of 2-D and 3-D. surface.
8. SCILAB -CODE for computing double integrals in Cartesian coordinates.
9. SCILAB -CODE for computing triple integrals in Cartesian coordinates.
10. SCILAB –CODE for computing and plotting grad of scalar point function .
11. SCILAB –CODE for computing and plotting divergence of vector point functions.
12. SCILAB –CODE for computing and plotting curl of Vector point functions.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	0	50	100

SLBT1011	English Proficiency and Aptitude Building -1	L	T	P	C
Version 1.03	Date of Approval:	0	0	4	2
Pre-requisites/Exposure					
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

1. Enhance formal writing skills
2. To understand soft-skills pertaining to industry

Course Outcomes

At the end of this course, the learner will be:

1. To further enhance grammar skills
2. To enhance the analytical, logical and quantitative skills of students.
3. Get overall personality enhancement

Course Catalogue

For any communication, the way a message is communicated, holds the key to its effectiveness. The course hence concentrates on the holistic approach thereby focusing on team work, negotiation skill, presentation skills and on balancing the emotional quotient of the individual.

Text Book

SLLL own text book

Reference Books

1. Communication Skills for Engineers, Mishra, Sunita & C. Muralikrishna, , Pearson
2. Corporate Soft skills, Sarvesh Gulati, 2006.
3. Effective Communication, John Adair , Macmillan Ltd.1997.
4. Developing Communication Skills, Krishna Mohan and Meera Bannerji, Macmillan India Ltd. 1990

BSCE1001	Introduction to Computer Science & Engineering	L	T	P	C
Version No. 1.1		0	0	2	1
Course Prerequisite	None				
co-requisites	None				

Course Objectives:

The objective of this course is to:

1. Provide an overview of computers and different development areas.
2. Learn and Identify different domains emerging.
3. Develop for student seek and idea about Internet and application.
4. Learn about the Data Analysis, Business Process and other fields.

Course Outcomes:

After completion of this course the student will be able to:

1. Understand the Fundamental of Computer and Programming Lanugages.
2. Understand when and how to take decisions, to compare and iterate, to how chose their career and line of action for future studies.
3. Recognize the Domain of Computers like grid, distributed, cloud and fogg computing.
4. To know about the Information system gateway and terminology.
5. Introduction about Data and Data Analysis with business process.
6. Develop idea about Internet of things and its applications.

Catalog Description:

This course introduces Engineering specially Computer Engineering in detail manner which will help the students to choose and identify different domain and career prospectus. Class lectures will cover the topics: Computer Fundamental, Hardware, software, Different era and field of computation with time, Grid, Cloud, fogg, virtulzation and green computing. It will also introduce students to Information system, Data analysis and Internet of Things and its applications.

Text Books:

1. Computer Fundamental – By P. K. Sinha
2. Cloud Computing: Concepts, Technology & Architecture – By ERL
3. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
4. Introduction to Information Security and Cyber Law – By Surya Prakash Tripathi, Ritendra Goel, Praveen Kumar Shukla

Reference Books

1. E. Balagurusamy 7th Edition, Programming ANSI C, McGraw-Hill
2. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)
3. Cloud Computing: Business Trends and Technologies, Igor Faynberg, Kui-Lan Lu, and Dor Skuler, Wiley, 2015

Course Content

Student must be aware of:- Basic English and logical Mind.

Unit I: Computer Fundamental **6 hours**

Block Diagram of Computer System, Component of system, Instruction, Instruction flow. Introduction of Software, Classification of software, Languages and its Generations, Flow Diagram, Algorithm, Pseudo codes. Evolution of Computer hardware and their effect in the fields with relevance of size, speed and output.

Unit II: Domains of Computing **6 hours**

Computers Application, Different era and field of computation with time, Advancement in computer field, Introduction to computing-grid, distributed, cloud, fog, Virtualization Green Computing , Operating system, difference between windows and Unix family, Basic Linux command-ls, cd, mv, man, mkdir, rmdir, touch, cat. Introduction to open source software.

Unit III : Information System **4 Lectures**

Introduction to Standards, Types of Standards; Open Standard, Closed Standard, Information Technology, Introduction to data communication and networking, standards and protocols. SMTP, POP3, DNS, HTPS, IPV4, IPV6, cyber Security, Viruses

Unit IV : Data Analysis **5 Lectures**

Data, Different types of Data and data Analysis, Business Analysis, Big-Data, Business and healthcare, Banking IT Infrastructure. Demonstration of Web Page analysis using goggle Page speed like pingdoom.com.

Unit V : Internet of Things **5 Lectures**

Internet, Introduction to IOT, Internet technologies, Advancement and applications in IOT, Professional society and association in computing, ethics

Mode of Evaluation: Written Examinations, Quizzes, Assignments.

	Laboratory evaluation scheme		
Components	**Internal Exam Practical (IEP) (50)** **= [(60% of M1) + (40% of M2)]**		**EEP (50)**
Max Marks	Mid Term Lab Exam (**M1** = 50)	End Term Lab Internal Exam (**M2** = 50)	50
Marks Distribution	CA(30) + Viva Voce(10) + Lab Question(10)	CA(30) + Viva Voce(10) + Lab Question(10	
Total Marks	**100**		

Name of the Course	Computer Programming and Problem Solving				
Course Code	BCSE1002				
Prerequisite					
Corequisite					
Antirequisite					
	L	T	P	C	
	0	0	4	2	

Course Objective

1. To understand computer programming and its roles in problem solving.

2. To understand and develop well-structured programs using C language.

3. To learn the basic data structures through implementing in C language.

Course Outcome

CO1	The student would learn the basic concepts of Computer and acquire various problem solving techniques such as algorithms and flowchart.
CO2	To understand the basic terminology used in programming and able to write, compile and debug programs in 'C' programming language and to develop program logics using decision structures and loop structures.
CO3	To develop program logics using the concept of arrays and arrays of characters.
CO4	To understand the modular techniques such as functions and difference between call by value and call by reference methods.
CO5	Implement and develop small projects using the concept Structures in C programming language.

Reference Book (s)

Alexis Leon and Mathews Leon, Introduction to Information Technology, Tata McGraw-Hill, 2001.

Let Us C 15 Edition, Yashavant Kanetkar, Bpb Publications, 2016.

R.G. Dromey, How to Solve it by Computer, Prentice Hall of India,2002.

Brian W. Kernighan and Dennis Ritchie, C programming Language, 2nd Edition, Pearson Education

E. Balagurusamy 7th Edition, Programming ANSI C, McGraw-Hill,2017.

Byron Gottfried, Programming with C, Schaum's Outline, 3 Edition, 2017.

List of Experiments	
1	Write a C program to swap the two numbers.
2	Write a C program to find the roots of a quadratic equation.
3	Write a C program to compute the factorial of a given number.
4	Write a C program to find the series of prime numbers in the given range.
5	Write a C program to generate Fibonacci numbers in the given range.
6	Write a C program to check for number palindrome.
7	Write a C program to generate Pascal Triangle.
8	Implement the following operations on matrices using C a) Sum of Two Matrices b) Product of Two matrices c) Transpose of Matrix
9	Write a C program to find Factorial, GCD, fibonacci, towers of hanoi, sum of digits, base conversions, reversal of numbers. (Using recursion).
10	Write a C program to implement all string operations(strlen(), strcpy(), , strcmp(), strcat(), strrev(), strstr(), strchr()) without using standard string library functions.
11	Write a C program to find the student grade by using structures.
12	Write a C program to perform the operations addition, subtraction, multiplication of complex numbers using structures.
13	Write a C program to copy the file contents from one file to another file(pass file names as command line arguments).

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	0	50	100

Name of The Course	**ENGINEERING CHEMISTRY LAB**			
Course Code	**CHEM-1002**			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives

This Engineering Chemistry Laboratory is common to first year branches of UG Engineering.

At the end of the course the student is expected to

Provide the students with a solid foundation in Chemistry laboratory required to solve engineering problems.

Practical implementation of fundamental concepts

Course Outcomes

CO1	Employ the volumetric titrations techniques used in chemistry laboratory for analysis.(K3)
CO2	Analyse to differentiate between hard and soft water using complexometric titration.(K2)
CO3	Calculate the percentage of dissolved oxygen in water sample.(K3)
CO4	Identify the viscosity of liquid using Ostwald viscometer.(K2)
CO5	Analyse the Carbohydrate and protein in given organic compound.(K3)

Course Content

S. No	List of Experiment
1	To estimate the total permanent and temporary hardness of the given hard water sample. A standard calcium ion solution (1 mg of $CaCO_3$ in 1 ml) and an approximately 0.01M solution of EDTA are provided.
2	To estimate the amount of Zinc in the given solution by using the standard solution of Potassium Ferrocyanide.
3	To Determine the Alkalinity of a given Water Sample
4	To find out the amount of dissolved oxygen in the given sample of water.
5	To find out relative and absolute viscosity of a given liquid using Ostwald's viscometer.
6	Detection of the elements in given organic compound.
7	To estimate the amount of Copper present in the given solution using a standard solution by provided hypo solution.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	**ENGINEERING PHYSICS LAB**			
Course Code	**PHYS-1002**			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives

To impart knowledge in basic concepts of physics relevant to engineering applications

To introduce advances in technology for engineering applications

Course Outcomes

CO1	Understand the physical principle involve in the various instruments and relate them to new applications.
CO2	Operate CRO and various optical instruments such as- spectrometer, travelling microscope and spherometer.
CO3	Calculate the physical constants by various methods such as- Planck's constant, wavelength of monochromatic light, angle of prism and realize the accuracy in measurements.
CO4	Develop the individual and team work for the performance of scientific works.
CO5	Develop the skill for making scientific graphs, error analysis and measurement technology used in engineering.

Course Content

S. No	List of Experiment
1	To determine the wavelength of He-Ne laser light by diffraction method at a single slit.
2	To study the polarization of light by simple reflection using He-Ne laser
3	To study the variation of magnetic field with distance along the axis of current carrying coil and then to estimate the radius of coil.
4	To verify the Stefan's law by electrical method.
5	To calibrate the ammeter and voltmeter with the help of potentiometer.
6	To determine the resolving power of telescope.
7	To measure the numerical aperture of an optical fiber.
8	Find the angle of a prism and calculate Cauchy's constant.
9	To determine the velocity of ultrasonic wave in liquid.
10	To find the frequency of A.C. mains using sonometer.

Continuous Assessment Pattern

	Laboratory evaluation scheme		
Components	**Internal Exam Practical (IEP) (50)** **= [(60% of M1) + (40% of M2)]**		**EEP (50)**
Max Marks	Mid Term Lab Exam (**M1** = 50)	End Term Lab Internal Exam(**M2** = 50)	50
Marks Distribution	CA(30) + Viva Voce(10) + Lab Question(10)	CA(30) + Viva Voce(10) + Lab Question(10	
Total Marks	**100**		

Semester II

Name of the Course	Linear Algebra and Differential equations				
Course Code	MATH1006				
Prerequisite					
Co requisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objective

To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.

To introduce and apply the concepts of rings, finite fields and polynomials.

To understand the basic concepts in number theory.

To examine the key questions in the Theory of Numbers.

To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

Course Outcome

CO1	Define various terminologies of linear algebra and differential equations
CO2	Summarize various methods and techniques of linear algebra and differential equations
CO3	Solve system of linear equations in finite dimensional vector space
CO4	Apply appropriate methods to solve nth order linear ordinary differential equations
CO5	Apply method of separation of variables to solve some problems of partial differential equations.

Text Books:

D. Poole, Linear Algebra: A Modern Introduction, 4th Edition, Brooks/Cole, 2015.

Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons.

Peter V. O'Neil, Advanced Engineering Mathematics, 7th Edition, Cengage Learning.

Reference Books:

R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5th Edition, Narosa Publishers.

Robert T. Smith and Roland B. Minton, Calculus, 4th Edition, McGraw Hill Education.

David C Lay, Linear Algebra and its application, 3rd Edition,

KENNETH HOFFMAN, Linear Algebra, 2nd Edition, PRENTICE-HALL, INC., Englewood Cliffs, New Jersey

Unit-1: Matrices 6 hours

Basic Operations on matrices and vectors, Determinants, Cramer Rule, Inverse of matrix using Gauss Jordan elimination, Rank of a matrix, Solution of system of linear equations: Gauss elimination.

Unit-2: Vector Spaces-I 10 Hours

Vector Space, Linear Independence of vectors, basis, dimension; Lineartransformations (maps), range and kernel of a linear map, rank, nullity, rank-nullity theorem, Inverse of a linear transformation, composition of linear maps, Matrix associated with a linear map.

Unit-3: Vector Spaces-II 10 Hours

Eigen values, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices,eigenbases, Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Unit-4: Ordinary Differential Equations 10 Hours

Basic concepts, Exact differential equations, Linear differential equations of second and higher order with constant coefficients, Method of variation of parameters,Cauchy-Euler equation, System of linear differential equations with constant coefficients, applications oflinear differential equations.

Unit-5: Partial Differential Equation 9 Hours

Basic concepts, Classification of second order linear PDE, Method ofseparation of variables and its application in solving Wave equation (one dimension), heat equation (onedimension) and Laplace equation (two dimension steady state only).

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of the Course	Product Design using Graphics			
Course Code	BTME1002			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	4	2

Course Objective

To inculcate how to expresses ideas of technical nature with a pragmatic intention.

To explore from the first idea and intuitive concepts to the final development and evaluation of the quality of a product.

Helping students understand the role of engineering graphics in a product design process.

Course Outcome

CO1	Understand the concept and principles of engineering graphics in product design.
CO2	Make isometric and orthographic projection of solids along with free hand sketching.
CO3	Develop a solid model using AutoCAD
CO4	Make a solid model for a given assembly using AutoCAD.
CO5	Apply the concepts and techniques learnt in the course to make hands-on project.

TEXT BOOKS

Asimow, M. (1962). Introduction to design. Englewood Cliffs: Prentice-Hall.

K C John (2009), Engineering Graphics for Degree, Prentice Hall of India. ISBN: 978-8-120-33788-3.

P N Rao (2010), CAD/CAM Principles and Applications, 3rd Edition, Tata McGraw-Hill Education, ISBN: 978-0-070-68193-4.

Unit-1: Introduction – Understanding the Concept of Product Design 13 hours

Fundamentals of Design : Design by Evolution and Design by Innovation, Principles that govern any design, Morphology and Process of Design, Application of Graphics in Design, Engineering Graphics: An Overview, Introduction to Computer Aided Drafting, Lettering, Numerals and Dimensioning.

Unit-2: Projection of Solids 12 Hours

Concept of Projection, Object in four quadrant, 2-D description of quadrants, Orthographic Projection of Solids, Isometric Projection of Solids, Free-hand sketching.

Unit-3: Solid Modeling 12 Hours

Division of Engineering Solids- Polyhedra, Regular and Irregular polyhedral, solids of revolution, Geometric Modeling – Wireframe, B-Rep and Solid Modeling, Solid Modelling using AutoCAD

Unit-4: Introduction to Assembly 11 Hours

Types of assembly drawings, Accepted Norms for Assembly Drawings, Sequences of Preparing the Assembly Drawing, Solid Modeling of assembly

Unit-5: Application of Design Concepts for Product Design 10 Hours

Hands-on Project in Groups: Choose a specific objective for Product Design, Design the Product and Model it using AutoCAD, presentation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of the Course	Environmental Science				
Course Code	ENVS1001				
Prerequisite					
Co requisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objective

To develop solid foundation for further study of electrical and electronics courses

To develop the analytical skills for solving the electrical and electronics circuits

To learn the utility of basic electronics devices and circuits

To understand the basic principles of electrical machines

Course Outcome

CO1 Identify the scope and importance of studying the environment and analyze the problems associated with various natural resources. (K4)

CO2 Determine the harmful effects of toxic chemicals on living beings and environment. (K2)

CO3 Identify the harmful effects of environmental pollution and apply suitable control methods. (K4)

CO4 Analyze the different social issues affecting the society and environment. (K4)

CO5 Interpret and utilize the different tools of Green Chemistry towards generating a zero waste environment (K3)

Text Book (s)

Environmental Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2008, ISBN:978-81-224-2159-0.

Environmental Studies, Suresh K. Dhameja, S.K. Kataria and Sons , 2008, ISBN: 81-88458-77-5

Text Book of Environmental Studies, Erach Bharucha, University Press (India) Private Limited, 2005, ISBN: 978 81 7371 540 2

Environmental Studies (From Crisis to Cure) Second Edition. , R. Rajagopalan, Oxford University Press, 2012, ISBN 0-19-807208-2.

Environmental Studies, Ranu Gadi, Sunitta Rattan, Sushmita Mohapatra, S.K. Kataria and Sons, 2008, ISBN: 81-89757-98-9.

Reference Book (s)

Environmental Studies , Benny Joseph , Tata McGraw Hill Education Private Limited, 2009, ISBN: 987-0-07-064813-5.

Environmental Studies, Anindita Basak, Pearson Education, 2009, ISBN: 978-81-317-2118-6.

Principles of Environmental Science (Inquiry and Applications), William P. Cunningham & Mary Ann Cunningham, Tata McGraw Hill Education Private Limited, 2007, ISBN: 987-0-07-064772-0.

Unit I: Environment and Natural Resources 10 Lectures

Definition, scope, importance, need for public awareness, Environmental Management Systems its objectives, components, EIA, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, Mineral resources –Use and exploitation, environmental effects of extracting and using mineral resources, Food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, landslides, soil erosion, desertification & case studies.

Unit II: Chemical Toxicology 7 Lectures

Toxic chemicals in the environment, Impact of toxic chemicals on enzymes, biochemical effects of arsenic, cadmium, lead, chromium, mercury, biochemical effects of pesticides

Unit III: Environmental Pollution 10 Lectures

Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides.

Unit IV: Social Issues, Human Population and the Environment 10 Lectures

Urban problems related to energy & sustainable development, water conservation, problems related to rehabilitation – case studies, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness. Population growth, variation among nations, Population explosion, Environment and human health, Value Education, Women and Child Welfare, Role of Information Technology – Visit to local polluted site /Case Studies.

Unit V: Green Chemistry 4 Lectures

Introduction, Basic principles of green technology, concept of Atom economy, Tools of Green technology, zero waste technology.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Practical semester II

Name of the Course	Exploration with CAS-II				
Course Code	MATH1008				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objective

Open source software tools like Sci lab also demands an open and free learning resource. Learn CA x brings to you a free course which will introduce you to the basics of programming using Sci lab along with examples and supporting material. Register now if you are curious about Sci lab and want to get started with programming in Sci lab.

Course Outcome

CO1 Demonstrate knowledge of Sci Lab for solving simple problems.

CO2 Apply commands of Sci Lab for solving a system of equations including eigen value problems.

CO3 Write a program in Sci Lab to solve a initial value problems.

CO4 Solve domain related problems using Sci Lab

References

Urroz, G E., Numerical and Statistical Methods with SCILAB for Science and Engineering ,Vol 1 Book Surge Publishing, 2001, ISBN-13: 978-1588983046

Software site: http://www.scilab.org, official scilab website

Wikipedia article: http://en.wikipedia.org/wiki/Scilab

List of Experiments

Review of working with Scilab

Using Scilab for basic operations on matrices including inverse, rank, trace and determinant of a matrix.

Using Scilab to determine LI of vectors and determining solution of system of linear equations.

Use of Scilab to find the Kernel, range and verification of rank and nullity theorem.

Matrix representation of any linear transformation, using Scilab to find inverse of a linear transformation.

Using Scilab to compute the Eigen Values and Vectors and check whether a given matrix is symmetric, skew-symmetric, orthogonal.

Develop a code in Scilab for Gram-Schmidt orthogonalization process.

Solving an initial value problem of II order and plotting the solution.

Solving an initial value problem of first and second order (domain specific) and plotting the solution of problem

Using Scilab to Solve one dimensional wave equation under specified conditions and graphing the solution.

Using Scilab to solve one dimensional heat equation under specified conditions and graphing the solution.

Using Scilab to Solve a Laplace equation to find the steady state temperature in the square plate satisfying specific boundary conditions and graphing isotherms

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	0	50	100

SLBT1012	English Proficiency and Aptitude Building - 2	L	T	P	C
Version 1.03	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of semester 2				
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

Enhance formal writing skills
To understand soft-skills pertaining to industry

Course Outcomes

At the end of this course, the learner will be:

To further enhance grammar skills
To enhance the analytical, logical and quantitative skills of students.
Get overall personality enhancement

Course Catalogue

For any communication, the way a message is communicated, holds the key to its effectiveness. The course hence concentrates on the holistic approach thereby focusing on team work, negotiation skill, presentation skills and on balancing the emotional quotient of the individual.

Text Book

SLLL own text book

Reference Books

1. Communication Skills for Engineers, Mishra, Sunita & C. Muralikrishna, , Pearson
2. Corporate Soft skills, Sarvesh Gulati, 2006.
3. Effective Communication, John Adair , Macmillan Ltd.1997.
4. Developing Communication Skills, Krishna Mohan and Meera Bannerji, Macmillan India Ltd. 1990

Name of the Course	Application Oriented Programming using Python				
Course Code	BCSE1003				
Prerequisite					
Co requisite					
Antirequisite					
	L	T	P	C	
	0	0	4	2	

Course Objective

To know the basics of algorithmic problem solving

To read and write simple Python programs.

To develop Python programs with conditionals and loops.

To define Python functions and call them.

To use Python data structures –- lists, tuples, dictionaries.

List of Experiments
Implement Python script to read person's age from keyboard and display whether he is eligible for voting or not.
Implement Python script to find biggest number between two numbers.
Implement Python Script to generate prime numbers series up to n
Implement Python Script to check given number is palindrome or not.
Implement Python script to print factorial of a number.
Implement Python Script to perform various operations on string using string libraries
Implement Python Script to check given string is palindrome or not.
Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.
Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between 1000 and 2000.
Define a function which generates Fibonacci series up to n numbers
a) Write a program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple which contains every number. Suppose the following input is supplied to the program:34,67,55,33,12,98. Then, the output should be: ['34', '67', '55', '33', '12', '98'] ('34', '67', '55', '33', '12', '98'). b) With a given tuple (1,2,3,4,5,6,7,8,9,10), write a program to print the first half values in one line and the last half values in one line.

a) Write a python script to perform basic dictionary operations like insert, delete and display. b) Write a python script to find frequency of words in a file using dictionaries.
a) Write Python script to display file contents. b) Write Python script to copy file contents from one file to another.

Course Outcome

CO1	Gain knowledge of Basic Programming with Python
CO2	Learn to create and use functions and modules.
CO3	Familiarize with python string handling techniques and user defined functions
CO4	Understand and use data structures like Lists, tuples and dictionaries.
CO5	Understand text and csv File handling

References

Allen B. Downey, Think Python: How to Think Like a Computer Scientist, Shroff/O'Reilly; Second edition, 2016.

Tony Gaddis, Starting Out with Python, 3rd edition, Pearson, 2014.

Y. Daniel Liang, Introduction to Programming Using Python, Pearson, 2013.

Budd T A, Exploring Python , 2011, Tata McGraw Hill Education, 2011.

Downey, Allen B., Think Python: How to Think Like a Computer Scientist. O'Reilly, 2012

Python Programming: An Introduction to Computer Science (Second Edition) John Zelle, ISBN 978-1-59028-241-0-9, Franklin, Beedle & Associates Inc., 2004.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	0	50	100

Semester III

Name of the Course	Discrete Structures				
Course Code	MATH2007				
Prerequisite					
Co requisite					
Antirequisite					
		L	T	P	C
		3	1	0	4

Course Objective

Develop a foundation of set theory concepts and notation

Explore a variety of various mathematical structures by focusing on mathematical objects, operations, and resulting properties

Develop formal logical reasoning techniques and notation

Demonstrate the application of logic to analyzing and writing proofs

Develop techniques for counting, permutations and combinations

Develop the concept of relation through various representations (digraphs, matrices, lists)

Course Outcome

CO1	Implement algorithms
CO2	Prove computational theorems
CO3	Analyze computational systems
CO4	Communicate technical results

REFERENCES:

Liu and Mohapatra, “Elements of Distcrete Mathematics”, McGraw Hill

Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw-Hill

R.P. Grimaldi, Discrete and Combinatorial Mathematics, Addison Wesley,

Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill,

B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, PHI

Unit-1: Set Theory 9 hours

Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets.Relations: Definition, Operations on relations, Properties of relations, Composite Relations,Equality of relations, Recursive definition of relation, Order of relations.Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of Functions.Natural Numbers: Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases. Proof Methods, Proof by counter – example, Proof by contradiction.

Unit-2: Algebraic Structures 9 Hours

Definition, Groups, Subgroups and order, Cyclic Groups, Cosets,Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields, Integers Modulo n.

Unit-3: Partial order sets 9 Hours

Definition, Partial order sets, Combination of partial order sets, Hasse diagram.Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

Unit-4: Propositional Logic 9 Hours

Proposition, well formed formula, Truth tables, Tautology, Satisfiability,Contradiction, Algebra of proposition, Theory of Inference Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

Unit-5: Trees 9 Hours

Definition, Binary tree, Binary tree traversal, Binary search tree. Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs,Planar graphs,Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloringRecurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences.Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of the Course	Introduction to Cryptographic Fundamentals			
Course Code	BCSE2330			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objective

To understand Cryptography Theories, Algorithms and Systems.

To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

Course Outcome

CO1	Learn to analyze the security of the in-built cryptosystems.
CO2	Develop authentication schemes for identity and membership authorization.
CO3	Develop cryptographic algorithms for information security.

TEXT BOOK:

D. R. Stinson, Cryptography: Theory and Practice, 3rd ed. Boca Raton, FL: Chapman & Hall/CRC, 2005. (ISBN No.: 978-1-58-488508-5)

W. Stallings, Cryptography and Network Security: Principles and Practice, 5th Ed. Boston: Prentice Hall, 2010. (ISBN No.: 978-0-13-609704-4)

J. H. Silverman, A Friendly Introduction to Number Theory, 4th Ed. Boston: Pearson, 2012.

C. Kaufman, R. Perlman, and M. Speciner, Network Security: Private Communication in a Publ

REFERENCES:

"Atul Kahate, Cryptography and Network Security, 2nd ed., Tata Mcgraw Hill education Private Limited, 2011.

Computer Security, Dieter Gollman,3rd ed, Wiley Publications,2011.

Introduction to Computer Security, Matt Bishop,1st ed,Addison-Wesley Proffesional,2004.

Hand Book of Applied Cryptography, by Alfred Menezes, Paul van Oorschot, Scott Vanstone , CRC.

Unit-1: Introduction to Security 9 hours

Information Security - Confidentiality, Integrity & Availability – Authentication, Authorization & Non-Repudiation – Introduction to Plain Text, Cipher Text, Encryption and Decryption Techniques, Secure Key, Hashing, Digital signature.

Unit-2: Symmetric and Asymmetric Encryption 9 Hours

"Block cipher, Stream Cipher - Data Encryption Standard (DES) - Cipher Block Chaining (CBC) - Multiple Encryption DES - International Data Encryption Algorithm (IDEA) - Advanced Encryption Standard (AES).

Asymmetric key generation techniques – Applications of Asymmetric encryption methods – RSA- Elliptic Curve Cryptography"

Unit-3: Digital Signatures 9 Hours

Digital signature standards - Secure One-time Signatures - Application of Digital Signatures - Diffie-Hellman Key Exchange - Elliptic Curve Digital Signature algorithm.

Unit-4: Hashing and Message Digests 9 Hours

Cryptographic Hash Functions- Applications- Simple hash functions and features for ensuring security - Hash functions based on Cipher Block Chaining- Secure Hash Algorithm (SHA) - Message Digest - MD5.

Unit-5: Applications of Cryptographic Algorithms 9 Hours

Applying cryptography algorithms - Smart cards-Mobile phone security - Electronic passports and ID cards - SDA/DDA/CDA Bank Cards - Financial Cryptography – Secure Payment Systems - Crypto currencies – Bitcoin.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of the Course	Data Structure Using C++			
Course Code	BCSE2320			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objective

To understand data structure Theories, Algorithms and Systems.

To understand necessary Approaches and Techniques to build data structure algorithm.

Course Outcome

CO1	Learn to analyse the data structure.
CO2	Develop algorithm of data structure.
CO3	Develop algorithm for different data structure.

References :

1. Aaron M. Tenenbaum,YedidyahLangsam and Moshe J. Augenstein “Data Structures Using C and C++”, PHI

Learning Private Limited, Delhi India

2. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publications Pvt Ltd Delhi India.

3. A.K. Sharma ,Data Structure Using C, Pearson Education India.

4. Rajesh K. Shukla, “Data Structure Using C and C++” Wiley Dreamtech Publication.

5. Lipschutz, “Data Structures” Schaum’s Outline Series, Tata Mcgraw-hill Education (India) Pvt. Ltd .
6. Michael T. Goodrich, Roberto Tamassia, David M. Mount “Data Structures and Algorithms in C++”, Wiley India.

7. P.S. Deshpandey, “C and Datastructure”, Wiley Dreamtech Publication.

8. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education

9. Berztiss, A.T.: Data structures, Theory and Practice :, Academic Press.

10. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw

Hill.

Unit - I

Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time

and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT)

Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and

Column Major Order, Application of arrays, Sparse Matrices and their representations. Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition,Generalized Linked List .

Unit – II

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack

in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower

of Hanoi Problem, Simulating Recursion, Principles of recursion,Tail recursion, Removal of recursion Queues,

Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation

of queues in C, Dequeue and Priority Queue.

Unit – III

Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic

Representation, CompleteBinary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked

Representation of Binary trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary

trees, Traversing Threaded Binary trees, Huffman algorithm.

Unit – IV

Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List,

Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component,

Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transistive Closure and Shortest

Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Introduction to Activity Networks

Unit – V

Searching : Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort,

Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Radix Sort, Practical consideration for

Internal Sorting.

Search Trees: Binary Search Trees(BST), Insertion and Deletion in BST, Complexity of Search Algorithm,

AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees .

Hashing: Hash Function, Collision Resolution Strategies

Storage Management: Garbage Collection and Compaction.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of the Course	Digital Design and Computer Architecture			
Course Code	BCSE2310			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objective

Learn how to design digital circuits by simplifying the Boolean functions. Also, gives an idea about designs using PLDs, and writing HDL codes for designing larger digital systems.

Course Outcome

CO1	Understand the basics of logic gates, K-map, various circuit designing models.
CO2	Understand the concepts of combinational circuits and sequential circuits.
CO3	Understand the architecture of digital system by using machine language.
CO4	Understand the fundamentals of microarchitecture using x86 architecture
CO5	Identify core concepts of Memory and I/O systems.

TEXT BOOKS

David Harris, Sarah Harris, Digital Design and Computer Architecture,2nd Edition ISBN: 978-0-12-394424-5, ISBN10:0123944244, Elsevier Science & Technology , 2013.

M. Morris Mano and Michael D. Ciletti, “Digital Design”, IV Edition, Pearson Education, 2008.

REFERENCES:

John F. Wakerly, “Digital Design Principles and Practices”, Fourth Edition, Pearson Education, 2007.

Charles H. Roth Jr, “Fundamentals of Logic Design”, Fifth Edition – Jaico Publishing House, Mumbai, 2003.

Donald D. Givone, “Digital Principles and Design”, Tata MCGraw Hill, 2003.

Unit-1: Introduction 9 hours

Introduction, Logic Gates, Digital Abstraction. Combinational Logic Design-Boolean Equations, Boolean Algebra, From Logic to Gates, Multilevel Combinational Logic, X's and Z's, Oh My, Karnaugh Maps, Combinational Building Blocks, Timing.

Unit-2: Hardware Description Languages 9 Hours

Sequential Logic Design-Introduction, Latches and Flip-Flops, Synchronous Logic Design, Finite State Machines, Timing of Sequential Logic, Parallelism, Structural Modeling, More Combinational Logic, Data Types, Parameterized Modules, Testbenches.

Unit-3: Digital Building Blocks & Architecture 9 Hours

Introduction, Arithmetic Circuits, Number Systems, Sequential Building Blocks, Memory Arrays, Logic Arrays. Architecture: Introduction, Assembly Language, Machine Language, Programming, Addressing Modes, Lights, Camera, Action: Compiling, Assembling, and Loading, Odds and Ends, Real-World Perspective: x86 Architecture.

Unit-4: Microarchitecture 9 Hours

Introduction, Performance Analysis, Single-Cycle Processor, Multicycle Processor, Pipelined Processor, HDL Representation, Exceptions, Advanced Microarchitecture, Real-World Perspective: x86 Microarchitecture

Unit-5: Memory and I/O Systems 9 Hours

Introduction, Memory System Performance Analysis, Caches, Virtual Memory. I/O - Introduction, Embedded I/O Systems, PC I/O Systems, Real-World Perspective: x86 Memory and I/O Systems.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course code BCSE2310	Digital Design and Computer Architecture	Learning Schedule			
		L	T	P	C
	Pre-requisites: Computer Basic	3	0	0	3

COURSE DESCRIPTION

This course begins with an introduction to organizational Basic building block diagram of a digital computer system. As the course progresses each major block ranging from Processor to I/O will be discussed in their full architectural detail. The course talks primarily about Computer Organization and Architecture issues, Architecture of a typical Processor, Memory Organization, I/O devices and their interface and System Bus organization etc.

COURSE OBJECTIVES

The objective of this course is to:

explain the organization of the classical von Neumann machine and its major functional Modules.

explain how an instruction is executed in a classical von Neumann machine.

provide knowledge of computer system organization and structure through instruction cycles.

provide knowledge of system interconnection and the different I/O techniques.

explain the basic concepts of interrupts and how interrupts are used to implement I/O control and data transfers.

identify various types of buses in a computer system and illustrate how data transfers is performed.

COURSE OUTCOMES

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

understand and analyze computer architecture and organization, computer arithmetic, and CPU design

understand I/O system and interconnection structures of computer

understand and analyze different interrupts, I/O techniques, PLDs and memory.

incorporate independent learning skills and be able to learn more about different computer architectures and hardware.

COURSE CONTENT

Unit I: Basic structure of computers

Functional Modules - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations– Stacks and queues.

Unit II: Arithmetic Module

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multi-plication and fast multiplication – Integer division – Floating point numbers and operations.

Unit III: Basic processing Module

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

Unit IV: Memory System

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage.

Unit V: PLD, Memories and Logic Families

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).

TEXT BOOKS

Computer Organization - Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition, McGraw-Hill, 2002.

REFERENCE BOOKS

Computer Organisation and Design - Patterson, Elsevier Pub. 2009

Computer Organization and Architecture – Designing for Performance - William Stallings, Pearson Education, 2003.

Computer Organization and Design: The hardware / software interface - David A.Patterson and John L.Hennessy, Morgan Kaufmann, 2002.

Computer Architecture and Organization - John P.Hayes, McGraw Hill, 1998.

Name of The Course	Engineering Thermodynamics
Course Code	BTME2002
Prerequisite	
Corequisite	
Antirequisite	

	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

To learn the basic principles of classical thermodynamics.

To apply the laws of thermodynamics to various systems and analyze the significance of the results.

To analyze the performance of thermodynamic gas and vapour power cycles.

Course Outcomes

CO1	demonstrate basic understanding and knowledge of thermodynamic properties.
CO2	demonstrate basic understanding and knowledge of first law of thermodynamics and its application to open and closed systems
CO3	demonstrate basic understanding and knowledge of the second law of thermodynamic and its application to open and closed systems.
CO4	demonstrate basic understanding and knowledge of entropy and its application to engineering systems.
CO5	perform the basic thermal analysis of thermodynamic cycles

Text Book (s)

P. K. Nag (2010), Basic and Applied Thermodynamics, Tata McGraw-Hill Publishing Company Ltd., ISBN 978-0-070-15131-4

Reference Book (s):

Yunus A. Cengel and Michael A. Boles, Thermodynamics, An Engineering Approach, 8th Ed., McGraw Hill, 20015, ISBN: 978-9-339-22165-2.

Unit-1 **Basic Concepts of Thermodynamics** 9 Hours
Thermodynamics and Energy, Macroscopic and microscopic viewpoint, Closed and open systems, Thermodynamic properties of a system, State and equilibrium, Processes and cycles, Forms of energy , Temperature and its measurement, Zeroth law of thermodynamics.
Unit-2: First Law of Thermodynamics 9 Hours
Work transfer, pdV work, Types of work transfer, Net work done by a system, heat transfer, path function, Specific heat and latent heat, First law of thermodynamics for a closed system undergoing a cycle and change of state, Energy – a property of the system, enthalpy, specific heat at constant pressure and volume, PMM-I, Control volume, First law applied to steady flow process, Mass and energy balance
Unit-3 : Second Law of Thermodynamics 9 Hour
Limitations of the first law of Thermodynamics, Kelvin-Planck statement of the second law of thermodynamics, Clausius statement, Equivalence of Kelvin- Planck and Clausius statements, Heat engine, Refrigerators, Heat Pump, COP, Carnot's theorem, Corollary of Carnot's theorem, Reversible and Irreversible process, Efficiency of Reversible Heat engine, PMM-II, Carnot cycle.
Unit-4 : Entropy and properties of pure sustances 9 Hours
Introduction, Clausius theorem, Entropy – property of the system, Clausius inequality, Entropy change in irreversible process, Entropy principle, Reversible adiabatic work in steady flow system, Availability and irreversibility, Second law efficiency, p-v, p-T and T-s diagrams for a pure substance, Quality, Introduction to steam tables.
Unit-5 : Thermodynamic Cycles 9 Hours
Carnot cycle, Otto cycle, Diesel and Dual cycles, Brayton and reversed Brayton Cycle, Rankine cycle

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course code BCSE 2340	Theory of Automata & Formal Language	Learning Schedule			
		L	T	P	C
	Pre-requisites: ADA	3	1	0	4

COURSE DESCRIPTION

This course introduces some fundamental concepts in automata theory and formal languages including grammar, finite automaton, regular expression, formal language, pushdown automaton and Turing machine. This subject not only forms the basic models of computation, it also includes the foundation of many branches of computer science, e.g. compilers, software engineering, concurrent systems, etc. The properties of these models will be studied and various rigorous techniques for analysing and comparing them will be discussed, by using both formalism and examples.

COURSE OBJECTIVES

introduce the student to the concepts of theory of computation in computer science.

acquire insights into the relationship among formal languages, formal grammars, and automata.

learn to design automats and Turing machine

COURSE OUTCOMES

demonstrate an understanding of abstract models of computing, including deterministic (DFA), non-deterministic (NFA), and Turing (TM) machine models.

demonstrate an understanding of regular expressions and grammars, including context-free and context-sensitive gram-mars.

understand the relationships between language classes, including regular, context-free, context-sensitive, recursive, and recursively enumerable languages.

able to design Turing Machine

TEXT BOOKS

Theory of Computer Science : Automata, Languages and Computation - K.L.P. Mishra and N.Chandrasekaran,", PHI

Introduction to Languages and Theory of Computations - Martin J. C., TMH

REFERENCE BOOKS

Introduction to Automata Theory, Languages and Computation - Hopcroft, Ullman, Pearson Education

Elements of the Theory of Computation - Papadimitrou, C. and Lewis, C.L, PHI

COURSE CONTENT

Unit I: Introduction

Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transit ion, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem.

Unit II: Regular expression (RE)

Regular expression (RE) Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to 39 Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages . Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

Unit III: Context free grammar (CFG) & Context Free Languages CFL)

Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammer, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.

Unit IV: Push Down Automata (PDA)

Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA.

Unit V: Turing machines (TM)

Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory.

Name of The Course	Introduction to Cryptographic Fundamentals Lab			
Course Code	BCSE2331			
Prerequisite				
Corequisite				
Antirequisite				
L	**T**	**P**	**C**	
0	**0**	2	1	

Course Objectives:
The primary objective of this course is to understand Cryptography Theories, Algorithms and Systems. To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

Course Outcomes

CO1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms
CO3	Apply the different cryptographic operations of public key cryptography
CO4	Apply the various Authentication schemes to simulate different applications
CO5	Understand various Security practices and System security standards

Text Book (s)

1	William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

Reference Book (s)

1	C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
2	BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3	Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

List of Experiments	
1	Demonstration of Symmetric conventional cryptographic techniques.
2	Demonstration of Symmetric classic cryptographic techniques
3	Demonstration of Asymmetric cryptographic techniques
4	Demonstration of Hashing and Message digest techniques
5	Design and implementation of new cryptographic algorithms
6	Demonstration and implementation of secure communication using standard crypto libraries
7	Implementation of smart card based server/client applications
8	Demonstration of authentication techniques
9	Developing cryptographic algorithms for innovative applications

Continuous Assessment Pattern:

Theory			**Practical**		
Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**(Continuous Assessment) IA**	**ETE**	**Total Marks**
20	15	30	15	20	100

SLBT 2021	English Proficiency and Aptitude Building -3	L	T	P	C
Version 1.0	Date of Approval:	0	0	4	2
Pre-requisites/Exposure					
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

1. Enable students in aptitude building
2. Enable students to use their aptitude knowledge effectively in decision making

Course Outcomes

At the end of this course, the learner will be:

1. Improve arithmetic aptitude
2. Learn tricks to solve aptitude questions faster, thereby saving time during competitive exams

Course Catalogue

A student's aptitude plays an important part in bridging the gap between the campus and the industry. The course starts the Aptitude chapters which include numbers, time and work as well as simple arithmetic like interest. The student is assisted to develop a better understanding of reasoning, which again is helpful for any competitive exam or entrance exam for higher studies.

Text Books

SLLL own text book

Reference Books

1. Quicker Maths , M Tyra
2. Quantitative Aptitude, Abhijeet Guha

Course code BCSE2321	Data structure using C++ Lab	Learning Schedule			
		L	T	P	C
	Pre-requisites: C++ Programming	0	0	2	1

COURSE OBJECTIVES

The objective of this course is to:

Understand Data Structure using C++ programming Language.

Understand DS concept like Stack, Queues, Linked list etc.

Understand design principles of Data Structure.

COURSE OUTCOMES

At the end of the course student will be able to understand Data Structure.

Creating different data structute like Tree, Graph etc.

LIST OF EXPERIMENT (based on):

Arrays

Linked List

Queues

Stacks

Searching Technique

Linear Search

Binary Search

Sorting Technique

Selection Sort

Insertion Sort

Heap Sort

Radix Sort etc.

Trees

Graphs

	Course code	Industry Oriented Java I	LTPC
	BCSE2071		0021
Days	Topics	Description	Lectures
1	Basic Programming Concepts	Java Architecture	2
		Language Basic	
		Features of Java like Plateform independent, Garbage Collection.	
		Envoirnment Setup	
		Creating First Java Program	
		Java Programs - Data Types, Variables, initialization and assignment	
		Assessment	
2	Control Statements	Arithmetic Operators	2
		Relational and Logical Operators	
		Bitwise Operator	
		Ternary Operator	
		The if statement, The switch statement	
		Nesting of if statements	
		The for statement	
		Nested for loops	
		The while statement	
		The do while statement	
		The break and continue statement	
		Assessment	
3	OOPs	Introduction to Object Oriented Programming	2
		Classes and Objects	
		Methods - invoking methods	
		Passing parameters to Methods, Returning values from Method	
		Heap and stack variables	

		Assessment	
4	Arrays	Access specifiers	2
		Command Line Arguments	
		Scanner class	
		Introduction to arrays	
		Programming using Arrays, Array	
		Assessment	
5	Polymorphism, Abstraction and Encapsulation	Method Overloading	2
		Inheritance	
		Method Overiding	
		Runtime Polymorphism	
		Abstraction	
		Encapsulation	
		Assessment	
6	Constructor	Constructors	2
		The super keyword	
		This keyword	
		instanceOf	
		Conversion and casting	
		Assessment	
7	Abstraction	Abstract methods and Abstract classes	2
		Abstract classes and runtime polymorphism	
		Interfaces	
		Interfaces and runtime polymorphism	
		Assessment	
8	Wrapper Class	Wrapper classes	2
		Autoboxing and Unboxing	
		Variable Argument	
		Method Overloading with Widening, Autoboxing and Variable Argument	
		Assessment	
9	String	The Object class - toString method	2

		String, StringBuffer, StringBuilder Classes	
		Package	
		import and static import	
		Assessment	
10	Exception Handling	Introduction to Exception Handling	2
		The try-catch blocks and flow of programs	
		The finally block	
		Throwing an exception	
		The throws clause	2
		Rethrowing an exception	
		Checked and Unchecked exceptions	
		User defined exceptions	
		Assessment	

Name of The Course	Digital Design and Computer Architecture Lab				
Course Code	BCSE2311				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:

Understand the architecture of digital system by using machine language.

Course Outcomes

CO1	Understand the basics of logic gates, K-map, various circuit designing models.
CO2	Understand the concepts of combinational circuits and sequential circuits.
CO3	Understand the concepts of sequential circuits.
CO4	Understand the architecture of digital system by using machine language.
CO5	Identify core concepts of Memory and I/O systems

SPECIFICATION OF APPARATIUS USED:

- Power Supply, Digital Trainer Kit., Connecting Leads, IC's (7400, 7402, 7404, 7408, 7432, and 7486)

Title of Lab Experiments

- Introduction to Digital Electronics lab- nomenclature of digital ICS, specifications, studyof the data sheet, concept of vcc and ground, verification of the truth tables of logic gates using TTL ICS.
- To study and verify NAND and NOR as a universal gate.
- Implementation of the given Boolean function using logic gates in both sop and pos forms.
- Design and Implementation of Half Adder and Full Adder circuits using logic gates.
- Design and Implementation of Half Subtractor and Full Subtractor circuits using logic
- gates.
- Design and Implementation of One bit and Two bit Comparators.
- Design and Implementation of 3x8 Decoder.
- Design and Implementation of 8x3 Encoder.
- Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	Industry Oriented Python–I			
Course Code	BCSE2072			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

The objective is to introduce to the learner core programming concepts and equip them to write robust codes and solve complex problems by using procedural, object oriented, data structures and database connectivity concepts in Python.

Course Outcomes

CO1	Select decision-making and looping structures in programming, and apply Modular programming approach using methods and functions.
CO2	Incorporate object-oriented programming concept in programming.
CO3	Use of python packages in different data structures.
CO4	Design Python application with database connectivity
CO5	

Text Book (s)

Reference Book (s)

List of Exercise (Industrial oriented Python-1)

Course: Industry Oriented Python–I				
S.No.	**Topics**	**Sub-Topics**	**Days**	**Evaluation scheme**
1.	Python modules for AI and Machine Learning as per Google rating of applicability by the industries	Introduction to the following Modules --TensorFlow --Keras --Theano --Scikit-learn --Pytorch --Numpy --Scipy -Pandas --Seaborn		

		Note: For Teaching purpouse, we must teach at first Numpy, Scipy, Pandas and then TensorFlow		
2.	Numpy	--Installation --Concept of ndArray objects -- Data Types • Bool_ • int_ • intc • intp • int16 • int32 • int64 • uint8 • unit16 • uint32 • unit64 • float_ • float16 • float32,64 • Complex_ • Complex64, 128 ■ Data type objects ■ Ndarray.shape ■ Ndarray.ndim ■ Numpy.itemsize ■ Array creation routine ■ Array existing routine ■ Array from numerical ranges ■ Indexing and slicing ■ Advance indexing ■ Array manipulation ■ Binary operators	3	
3.	Scipy	--Basic Functionality --Cluster --Constants --integrate --interpolate --input and output	1	
4.	Pandas	--installation --Data operation in Pandas in form of series, DataFrame and Panel. --Pandas series --Pandas DataFrame --Pandas Panel --Data Cleansing --Processing CSV data --processing JASON data --processing XLS data --Merging data --Grouping data	3	

		--Concatenating Data --Data Aggregation		
4.	TensorFlow	--installation --introduction --Tensor Data Structure ■ Rank ■ Shape ■ Type --Dimensions of TensorFlow • One Dimensional • Two Dimensional --Tensor Handling and Manipulations	2	
		--Convoultional Neural network • TensFlow implementation of CNN --Recurrent Neural Network • Implementation	1	
		--TensorFlow visualization using TensorBoard	1	
		--Artificial Neural Network • Single Layer Perceptron • Double Layer Perceptron		
		--Algorithm for Linear Regression	1	
		--Hidden Layer of perceptron		
		--TensorFlow optimizers	1	
		--TensorFlow XOR implementations		
		Gradient Decent optimization		
	MatplotLib	--Pyplot API --Simple Plot --PyLab Module --Figure class --Axes Class --Multiplots --subplot --subplot2grid --Grids --Formatting Axes --Twin Axes --Bar Plot --Histogram --Pie chart --Scatter plot --Box plot	3	

Semester IV

Name of the Course	Operating System			
Course Code	BCSE2010			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	2	0	2	3

Course Objective

Gives an idea about process synchronization, inter-process communication, scheduling, deadlock handling, and memory management.

Course Outcome

CO1	Remember the classification and diversification of Operating system.
CO2	Understand the classical problems in Concurrent Processes and their solutions.
CO3	Implement different types of CPU Scheduling Algorithm along with the understanding of the concept of Deadlock in system and its methods of handling deadlocks.
CO4	Analyse the concept of memory management and paging concept in operating system.
CO5	Demonstrate the learnt knowledge with a optimized solution in the functions like memory management, I/O management and various scheduling algorithms and take care of deadlocks.

Text Book (s)

Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley, Ninth Edition, 2013.

D M Dhamdhere, “Operating Systems: A Concept based Approach”, McGraw Hill Education, 3 edition, 2012.

Reference Book (s)

Sibsankar Halder and Alex A Aravind, “Operating Systems”, Pearson Education India, 2014.

Harvey M Dietel, “ An Introduction to Operating System”, Pearson Education, 1990.

Unit-1 Introduction 9 hours

Operating system and functions, Classification of Operating systems-Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multi process Systems, Multithreaded Systems, Operating System Structure-Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.

Unit-2 CPU Scheduling 9 hours

Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

Unit-3 Concurrent Processes 9 hours

Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency-Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.

Unit-4 Memory Management 9 hours

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

Unit-5 Input/ Output 9 hours

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Data base Management Systems			
Course Code	BCSE2011			
Prerequisite	Structures and Algorithms", "Discrete Mathematics"			
Corequisite	"C-Programming"			
Antirequisite				

L	**T**	**P**	**C**
2	0	2	3

Course Objectives:

Develop the ability to design, implement and manipulate databases.

Introduce students to build data base management systems.

Able to store and analyze data into normalized format.

Apply DBMS concepts to various examples and real life applications

Course Outcomes

CO1	Learn knowledge of ER Modeling.
CO2	Apply programming concepts using DDL and DML commands in SQL.
CO3	Understand the storage system in Relational Database and imposing security.
CO4	Able to remove various anamolies from databses.
CO5	Understanding of transaction process.

Text Book (s)

1 "Database system concepts" Henry F Korth, Abraham Silberschatz, S. Sudurshan, McGraw-Hill

Reference Book (s):

Date C J, " An Introduction to Database Systems", Addision Wesley

Elmasri, Navathe, " Fudamentals of Database Systems", Addision Wesley

O'Neil, Databases, Elsevier Pub.

Leon & Leon,"Database Management Systems", Vikas Publishing House

Unit I: Introduction 9 lecture hours
Introduction: An overview of database management system, database system Vs file system, Database system concept and architecture, data model schema and instances, data independence and database language and interfaces, data definitions language, DML, Overall Database Structure.
Module II: Relational data Model and Language 9 lecture hours
Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus. Introduction on SQL: Characteristics of SQL, advantage of SQL. SQl data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL
Module III: Data Base Design & Normalization 10 lecture hours
Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.
Module IV: Transaction Processing Concept 6 lecture hours
Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling. Distributed Database: distributed data storage, concurrency control, directory system.
Module V: Concurrency Control Techniques 6 lecture hours
Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course code BCSE 3029		AI&ML using Python							
Version		School	SCSE	Date of Approval					
						L	T	P	C
						3	0	0	3
Total Number of Contact Hours					L	45	T	0	P	0
Pre-requisites		Data Structures and Algorithms							
Alternate Exposure		NA							
Co-requisites									
Course Outcomes	1	Describe the modern view of AI as the study of agents that receive and perceive from the Environment and perform actions							
	2	Demonstrate awareness of informed search and exploration methods							
	3	Explain about AI algorithms and techniques for knowledge representation, planning and uncertainty Management							
	4	Develop knowledge of decision making and learning methods							
	5	Explain the concept of Machine learning							
Specific Instructional Objectives	1								
	2								
	3								
	4								
Catalog Description									
Text Books	1	Stuart Russell and Peter Norvig Artificial Intelligence - A Modern Approach, Prentice Hall, 3rd edition, 2011.							
	2	Bishop, C. (2006). Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.							

	3	
	4	
Reference	1	1. Patrick Henry Winston, Artificial Intelligence, 3rd Edition, AW, 1999. 2. Elaine Ric, Kevin Knight and Shiv Shankar B. Nair, Artificial Intelligence, 3rd edition,
	2	3. Tata McGraw Hill, 2009. 4. George F. Luger, "Artificial Intelligence-Structures and Strategies for Complex
	3	5. Problem Solving", 6th edition, Pearson, 2008. 6. Donald A.Waterman, 'A Guide to Expert Systems', Pearson Education. 7. Duda, Richard, Peter Hart, and David Stork. Pattern Classification. 2nd ed. New York, NY: Wiley-Interscience, 2000. ISBN: 9780471056690.
	4	8. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995. ISBN: 9780198538646. 9. Introduction to Machine Learning - Ethem Alpaydin, MIT Press, Prentice hall of India
Online resources	1	
	2	
	3	

Unit 1	INTRODUCTION			Number of Lecture Hours	9
	History, Environment - Basic Problem Solving Agents - Intelligent agents, Problem and Search – Solving agents, Searching strategies - Uninformed Search, Informed Search - , Local searching strategies, Adversarial search – Optimal and imperfect decisions – Alpha, Beta pruning				
Pedagogy tools	Seminar	Lecture			
Unit 2	KNOWLEDGE AND REASONING			Number of Lecture Hours	9
	Logic Agents: Concepts and Logic Programming: Propositional Calculus, Propositional Logic, First Order Logic - Syntax and semantics - Inference in first order logic, Predicate Logic, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network				
Pedagogy tools	Seminar	Lecture			
Unit 3	PLANNING AND LEARNING			Number of Lecture Hours	9
	Planning: Planning problem – Partial order planning – Planning and acting in non-deterministic domains – Learning: Learning decision trees – Knowledge in learning – Neural networks – Reinforcement learning – Passive and active				
Pedagogy tools	Seminar	Lecture			
Unit 4	Machine Learning and Classification			Number of Lecture Hours	9

	Types of Learning: Supervised learning and unsupervised learning. Overview of classification: setup, training, test, validation dataset, over fitting. Classification Families: linear discriminative, non-linear discriminative, decision trees, probabilistic (conditional and generative), nearest neighbor			
Pedagogy tools	Seminar	Lecture		
Unit 5	Learning algorithms		Number of Lecture Hours	9
	Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines: Optimal hyper plane, Kernels. Model selection and feature selection. Combining classifiers: Bagging, boosting (The Ada boost algorithm), Evaluating and debugging learning algorithms, Classification errors			

BCSE2012	Data Communication and Computer Network	L	T	P	C
Version No. 1.0		3	0	0	4
Prerequisite	---				
co-requisites					

Course Objectives

The objective of this course is to:

1. Understand the fundamental concepts of data communications and networking.
2. Identify the basic components/instrument/equipment and their respective roles in data communication system
3. Understand the structure of computer networks, factors affecting computer network deployment.
4. Describe emerging technology in the net-centric computing area and assess their current capabilities, limitations and potential applications.
5. Program and analyse network protocols, architecture, algorithms and other safety critical issues in real-life scenario.

Course Outcomes

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

1. Understand the different networking sub-systems and their functions in a telecommunication system.
2. Understand and configure the different types of network topologies and protocols.
3. Understand the different protocols layers of the OSI model.
4. Examine and analyze the network-layer concepts like Network-Layer services –Routing -IP protocol -IP addressing
5. Examine and analyze the different link-layer and local area network concepts like Link-Layer services –Ethernet -Token Ring -Error detection and correction -ARP protocol

Catalog Description

This course primarily aims to acquaint the student with basic computer and communication networking technologies and the layered approach that makes design, implementation and operation of computer and communication networks possible. It also describe the complete study of OSI model which includes application layer: HTTP,FTP, SMTP, POP3, and peer-to-peer applications, transport layer: UDP, TCP and congestion control, network layer: switches, routers, IP protocols and routing algorithms, link layer: error detection and correction, multiple access, MAC addressing, etc. Upon completion of this course, student should have complete knowledge about computer network related hardware and software using a layered architecture.

Text Books

1. Forouzan, Data Communications and Networking, McGraw Hill, 4th ed.
2. Tannenbaum, Computer Networks ,Pearsoned Education.

Reference Books

1. William Stallings,Data and Computer Communications, Pearsoned Education
2. Hykins, Analog and Digital Communications, Wiley Publications.

Course Content

Unit I:Introduction Concepts **8 lecture hours**

Data and Signal fundamentals, Analog Signals, Digital Signals, Transmission Media: Guided and Unguided Media, Transmission Impairments, Categories of Networks, Network Topology Design - Delay Analysis, Switching methods, ISDN, The OSI reference model ,TCP/IP Protocol Suite, Comparison of OSI and TCP/IP.

Unit II: Digital and Analog Transmission **8 lecture hours**

Digital Transmission: Digital-to-Digital Conversion, Analog-to-Digital Conversion, Pulse Code Modulation, Delta Modulation, Digital-to-Analog Conversion, ASK,FSK,PSK, Analog-to-Analog Conversion, Modulation Techniques.

Unit III: Medium Access sub layer **8 lecture hours**

Medium Access sub layer - Channel Allocations, LAN protocols -ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary DataLink Protocols, Sliding Window protocols,Error Detection and Correction: Block coding, cyclic codes, Linear block codes, checksum.

Unit IV:Network and Transport Layer **8 lecture hours**

Network Layer - Point - to Pont Networks, routing, Congestion control, Internetworking -TCP / IP, IP packet, IP address, IPv6.

Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

Unit V: Application Layer **8 lecture hours**

Electronic mail, WWW,HTTP,SMTP,POP3,IMAP,FTP,SSH.

Course code BCSE 3029		AI&ML using Python							
Version		School	SCSE	Date of Approval					
						L	T	P	C
						3	0	0	3
Total Number of Contact Hours					L	45	T	0	P	0
Pre-requisites	Data Structures and Algorithms								
Alternate Exposure	NA								
Co-requisites									
Course Outcomes	1	Describe the modern view of AI as the study of agents that receive and perceive from the Environment and perform actions							
	2	Demonstrate awareness of informed search and exploration methods							
	3	Explain about AI algorithms and techniques for knowledge representation, planning and uncertainty Management							
	4	Develop knowledge of decision making and learning methods							
	5	Explain the concept of Machine learning							
Specific Instructional Objectives	1								
	2								
	3								
	4								
Catalog Description									

Text Books	1	Stuart Russell and Peter Norvig Artificial Intelligence - A Modern Approach, Prentice Hall, 3rd edition, 2011.
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	4	
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	3	5. Problem Solving", 6th edition, Pearson, 2008. 6. Donald A.Waterman, 'A Guide to Expert Systems', Pearson Education. 7. Duda, Richard, Peter Hart, and David Stork. Pattern Classification. 2nd ed. New York, NY: Wiley-Interscience, 2000. ISBN: 9780471056690.
	4	8. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995. ISBN: 9780198538646. 9. Introduction to Machine Learning - Ethem Alpaydin, MIT Press, Prentice hall of India
Online resources	1	
	2	
	3	

Unit 1	INTRODUCTION		Number of Lecture Hours	9
	History, Environment - Basic Problem Solving Agents - Intelligent agents, Problem and Search – Solving agents, Searching strategies - Uninformed Search, Informed Search - , Local searching strategies, Adversarial search – Optimal and imperfect decisions – Alpha, Beta pruning			
Pedagogy tools	Seminar	Lecture		
Unit 2	KNOWLEDGE AND REASONING		Number of Lecture Hours	9

<table>
<tr><td></td><td colspan="4">Logic Agents: Concepts and Logic Programming: Propositional Calculus, Propositional Logic, First Order Logic - Syntax and semantics - Inference in first order logic, Predicate Logic, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network</td></tr>
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<tr><td rowspan="2">Unit 4</td><td colspan="2">Machine Learning and Classification</td><td>Number of Lecture Hours</td><td>9</td></tr>
<tr><td colspan="4">Types of Learning: Supervised learning and unsupervised learning. Overview of classification: setup, training, test, validation dataset, over fitting. Classification Families: linear discriminative, non-linear discriminative, decision trees, probabilistic (conditional and generative), nearest neighbor</td></tr>
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<tr><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Unit 5</td><td colspan="2">Learning algorithms</td><td>Number of Lecture Hours</td><td>9</td></tr>
<tr><td colspan="4">Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines: Optimal hyper plane, Kernels. Model selection and feature selection. Combining classifiers: Bagging, boosting (The Ada boost algorithm), Evaluating and debugging learning algorithms, Classification errors</td></tr>
</table>

Practical

SLBT2022	English Proficiency and Aptitude Building -4	L	T	P	C
Version 1.0		0	0	4	2
Pre-requisites/Exposure	Completion of Semester 4				
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

1. Skill development related to classification of numbers
2. Implementing logical approach in decision making

Course Outcomes

At the end of this course, the learner will be:

1. Able to develop a logical thought process related to every aspect of life
2. Able to widen the horizon of one's thought process and data analysis skill
3. Able to interpret data and convert it into information

Text Books

SLLL own text book

Course Catalogue

It is imperative for a student to develop interpretation and analysis skills to be able to hold onto his own in this competitive world. The course thus, focuses on aptitude at the next level of reasoning and data interpretation.

Reference Books

1. Quicker Maths , M Tyra
2. Quantitative Aptitude, Abhijeet Guha

Industry Oriented Java II

Course code BCSE3071

LTPC

0021

Days	Topics	Description	Lectures
1	IO	Java input and output, Streams, byte streams and character streams, Input Stream, Output Stream, Reader, Writer	2
		File, File Input Stream, Buffered Input Stream, File Output Stream, Buffered Output Stream,	
		File Reader, Buffered Reader, File Writer, Buffered Writer	
		Input Stream Reader, Output Stream Writer	
		Assessment	
2	Serialization	Serialization-Object writing in file and reading	
		Marker Interface	2
		Assessment	2
3	Multithreading	Multithreaded programs, Thread class and Runnable interface, Synchronization	
		Assessment	
4	Collection	Collection framework and collection interfaces List, Queue, Set and Map	2
		List classes	
		For-each method for collection and iterators	
		Assessment	
5	Map	Set classes	2
		Map classes	
		Assessment	
6	Collections Class	The equals method and hash code method	2
		Comparator and hash Code ()	
		Collections Class	
		Assessment	
7	SQL	Introduction to SQL	2
		Creating table	

		Inserting data	
		Selecting data using SELECT clause	
		Restrict using WHERE clause	
		Comparison operators	
		Logical operators	
		Sorting data using ORDER BY clause	
		Updating data	
		Deleting data	
		Dropping the table	
		Assessment	
8	Connectivity	Introduction to JDBC API	2
		Types of drivers	
		Statement, Prepared Statement and Callable Statement	
		Performing insert, update and delete operations	
		Assessment	
9	JDBC	ResultSet	2
		Performing Select operations	
		Transaction management - commit and rollback	
		Assessment	
10	Project	Create a mini project using JDBC to perform Insert, Delete, Update and Select Operations	4
		Assessment	

Name of The Course	Industry Oriented Python–II			
Course Code	BCSE3072			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

The objective is to introduce to the learner core programming concepts and equip them to write robust codes and solve complex problems by using procedural, object oriented, data structures and database connectivity concepts in Python.

Course Outcomes

CO1	Select decision-making and looping structures in programming, and apply Modular programming approach using methods and functions.
CO2	Incorporate object-oriented programming concept in programming.
CO3	Use of python packages in different data structures.
CO4	Design Python application with database connectivity
CO5	

Text Book (s)

Reference Book (s)

List of Exercise (Industrial oriented Python-3)

1. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old.
2. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user. Hint: how does an even / odd number react differently when divided by 2?
3. Take a list, and write a program that prints out all the elements of the list that are less than 5.
4. Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides

evenly into another number. For example, 13 is a divisor of 26 because 26 / 13 has no remainder.)

5. Take two lists, and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.
6. Ask the user for a string and print out whether this string is a palindrome or not. (A **palindrome** is a string that reads the same forwards and backwards.)
7. Let's say I give you a list saved in a variable: `a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]`. Write one line of Python that takes this list `a` and makes a new list that has only the even elements of this list in it.
8. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game)

   Remember the rules:

- Rock beats scissors
- Scissors beats paper
- Paper beats rock

9. Generate a random number between 1 and 9 (including 1 and 9). Ask the user to guess the number, then tell them whether they guessed too low, too high, or exactly right.
10. Take two lists, and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.
11. Ask the user for a number and determine whether the number is prime or not. (For those who have forgotten, a prime number is a number that has no divisors.).
12. Write a program that takes a list of numbers (for example, `a = [5, 10, 15, 20, 25]`) and makes a new list of only the first and last elements of the given list. For practice, write this code inside a function.
13. Write a program that asks the user how many Fibonnaci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. Make sure to ask the user to enter the number of numbers in the sequence to generate.(Hint: The Fibonnaciseqence is a sequence of numbers where the next number in the sequence is the sum of the previous two numbers in the sequence. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, …)
14. Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates.
15. Write a program (using functions!) that asks the user for a long string containing multiple words. Print back to the user the same string, except with the words in backwards order. For example, say I type the string:

    My name **is** Michele

    Then I would see the string:

    Michele **is** name My

    shown back to me.

16. Write a password generator in Python. Be creative with how you generate passwords - strong passwords have a mix of lowercase letters, uppercase letters, numbers, and symbols. The passwords should be random, generating a new password every time the user asks for a new password. Include your run-time code in a main method.

17. Create a program that will play the "cows and bulls" game with the user. The game works like this:

    Randomly generate a 4-digit number. Ask the user to guess a 4-digit number. For every digit that the user guessed correctly in the correct place, they have a "cow". For every digit the user guessed correctly in the wrong place is a "bull." Every time the user makes a guess, tell them how many "cows" and "bulls" they have. Once the user guesses the correct number, the game is over. Keep track of the number of guesses the user makes throughout teh game and tell the user at the end.

18. Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.
19. Given a `.txt` file that has a list of a bunch of names, count how many of each name there are in the file, and print out the results to the screen.
20. Given two `.txt` files that have lists of numbers in them, find the numbers that are overlapping.

21. Let's say we want to draw game boards that look like this:

    ```
    ---------
    |||
    ---------
    |||
    ---------
    |||
    ---------
    ```

    This one is 3x3 (like in tic tac toe). Obviously, they come in many other sizes (8x8 for chess, 19x19 for Go, and many more).

    Ask the user what size game board they want to draw, and draw it for them to the screen using Python's `print` statement.

22. You, the user, will have in your head a number between 0 and 100. The program will guess a number, and you, the user, will say whether it is too high, too low, or your number.At the end of this exchange, your program should print out how many guesses it took to get your number.
23. Given a 3 by 3 list of lists that represents a Tic Tac Toe game board, tell me whether anyone has won, and tell me which player won, if any. A Tic Tac Toe win is 3 in a row - either in a row, a column, or a diagonal. Don't worry about the case where TWO people have won - assume that in every board there will only be one winner.
24. Implement a function that takes as input three variables, and returns the largest of the three. Do this without using the Python `max()` function!.
25. Let's continue building Hangman. In the game of Hangman, a clue word is given by the program that the player has to guess, letter by letter. The player guesses one letter at a

time until the entire word has been guessed. (In the actual game, the player can only guess 6 letters incorrectly before losing).

26. For this exercise, we will keep track of when our friend's birthdays are, and be able to find that information based on their name. Create a dictionary (in your file) of names and birthdays. When you run your program it should ask the user to enter a name, and return the birthday of that person back to them.
27. Write a Program to print an appropriate message if the number is positive.
28. Program to find the sum of all numbers stored in a list.
29. Program to iterate through a list using indexing.
30. Take values of length and breadth of a rectangle from user and check if it is square or not.
31. Take two int values from user and print greatest among them.
32. A school has following rules for grading system:
    a. Below 25 - F
    b. 25 to 45 - E
    c. 45 to 50 - D
    d. 50 to 60 - C
    e. 60 to 80 - B
    f. Above 80 - A
    Ask user to enter marks and print the corresponding grade.
33. A student will not be allowed to sit in exam if his/her attendence is less than 75%.
    Take following input from user
    Number of classes held
    Number of classes attended.
    And print
    percentage of class attended
    Is student is allowed to sit in exam or not.
34. Create a simple calculator which can perform basic arithmetic operations like addition, subtraction, multiplication or division depending upon the user input.
    Approach :
    · User choose the desired operation. Options 1, 2, 3 and 4 are valid.
    · Two numbers are taken and an if…elif…else branching is used to execute a particular section.
    · Using functions add(), subtract(), multiply() and divide() evaluate respective operations.
35. WAP to construct list of countries and using list comprehension write the initial letter of the countries.
36. Create a list with multiple programming language and display I
37. Love "Programming Language" for each entry.
38. Write a program to check if a year is leap year or not.
    If a year is divisible by 4 then it is leap year but if the year is century year like 2000, 1900, 2100 then it must be divisible by 400.
39. A 4 digit number is entered through keyboard. Write a

program to print a new number with digits reversed as of orignal one. E.g.-
INPUT : 1234 OUTPUT : 4321
INPUT : 5982 OUTPUT : 2895

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	0	50	100

Semester V

Name of The Course	Design & Analysis of Algorithms				
Course Code	BCSE3031				
Prerequisite	Data Struture & Algorthms				
		L	T	P	C
		3	0	0	3

Course Objectives:

The primary objective of this course is to introduce the topic of algorithms as a precise mathematical concept, and study how to design algorithms, establish their correctness, study their efficiency and memory needs. The course consists of a strong mathematical component in addition to the design of various algorithms.

Course Outcomes

CO1	Analyze the complexity of the algorithms and use technique divide and conquer to solve the problems
CO2	Identify feasible solutions for different problems through greedy method and minimize the solutions space and to solve the problems through dynamic programming.
CO3	Solve the problems through graph algorithms.
CO4	Justify that a certain problem is NP-Complete
CO5	Understand and apply linear programming concepts to real time applications.

Text Book (s)

1	Michael T. Goodrich and Roberto Tamassia: Algorithm Design: Foundations, Analysis and Internet examples (John Wiley &Sons, Inc., 2002).
2	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran. Fundamentals of Computer
3	Algorithms, MIT Press, Second Edition (Indian reprint: Prentice-Hall), 2008.

Reference Book (s)

1	Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, The MIT Press, 3rd edition, 2009.
2	RCT Lee, SS Tseng, RC Chang and YT Tsai, “Introduction to the Design and Analysis of Algorithms”, Mc Graw Hill, 2005.
3	Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” Pearson Education.

Course Contents:

Unit-1: Introduction 9 hours
Introduction: Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Sorting and order Statistics - Shell sort, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time.
Unit II: Tree 9 hours
Advanced Data Structures: Red-Black trees, B – trees, Binomial Heaps, Fibonacci Heaps.
Unit III : Algorithm 9 Hours
Divide and Conquer with examples such as Sorting, Matrix Multiplication, Convex hull and Searching. Greedy methods with examples Huffman Coding, Knapsack, Minimum Spanning trees – Prim's and Kruskal's algorithms, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.
Unit IV : Dynamic Programming 9 Hours
Dynamic programming with examples such as Knapsack, All pair shortest paths – Warshal's and Floyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.
Unit V : Computations 9 Hours
Selected Topics: Algebraic Computation, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

Name of The Course	Software Engineering & Testing Methodologies				
Course Code	BCSE3032				
Prerequisite					
		L	T	P	C
		2	0	4	4

Course Objectives: The scope of the course is concerns with the stages of the software engineering process, including requirements gathering, specification, design, implementation, and testing. Students will teach the various the testing techniques.

Course Outcomes:

CO1	Understand the key concerns that are common to all software development processes.
CO2	Able to select appropriate process models, approaches and techniques to manage a given software development process.
CO3	Able to elicit requirements for a software product and translate these into a documented design.
CO4	Recognize the importance of software reliability and how we can design dependable software, and what measures are used.
CO5	Understand the principles and techniques underlying the process of inspecting and testing software and making it free of errors and tolerable.

Text Book (s)

1	Software Engineering: A practitioner's Approach, Roger S Pressman, Sixth Edition. McGraw-Hill International Edition, 2005.
2	Software Engineering: Ian Summerville, Seventh Edition, Pearson Education, 2004.

Reference Book (s)

1	Fundamentals of Software Engineering: Rajib Mall, PHI, 2005.
2	Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
3	Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008.

Unit-1: Introduction to Software Engineering 9 hours
Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.
Unit II: Software Requirement Specifications (SRS) and Design 9 hours
Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design Data Flow Diagrams, Entity Relationship Diagrams.
Unit III : Software Testing Methods and Selection 9 Hours
Testing Objectives ,Faults, Errors, and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and correctness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.
Unit IV : Software Testing Methods and Selection 9 Hours
Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Integration Testing, , Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up, Acceptance Testing ,Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Regression testing, Regression test process, Initial Smoke or Sanity test, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.
Unit V : Software Project and Test Management 9 Hours
Software as an Evolutionary Entity, Need for Maintenance, Categories of maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Constructive Cost Models (COCOMO). Test Planning, Management, Execution and Reporting, Software Test Automation: Testing in Object Oriented Systems.

Name of The Course	Computer Graphics			
Course Code	BCSE3069			
Prerequisite				
Co requisite				
Antirequisite				
	L	T	P	C
	2	0	2	3

Course Objectives:

This course focuses on 2D and 3D interactive and non-interactive graphics. This course studies the principles underlying the generation and display of 2D and 3D computer graphics. In this course topics include geometric modeling, 3D viewing and projection, lighting and shading, color, and the use of one or more technologies and packages such as OpenGL, and Blender. Course requirements usually include exam and several programming or written homework assignments.

Course Outcomes

CO1	**To understand the principles, commonly used paradigms and techniques of computer graphics. e.g. the graphics pipeline, and Bresenham's algorithm for speedy line and circle generation.**
CO2	Be able to understand 2D graphics concepts in the development of computer games, information visualization, and business applications.
CO3	To develop a facility with the relevant mathematics of 3D graphics like projection, clipping and transformation
CO4	Be able to understand the representation of non linear shapes. E. g. Curves, hidden surfaces.
CO5	Be able to develop animations like motion sequence, morphing and illustrating models for lighting/shading.

Text Book (s)

1	**Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education, India; 2 edition 2002.**
2	Computer Graphics Principles and Practice, Second Edition in C, James D.Foley, Andries Van Dam, Steven K.Feiner, JhonF.Hughes, Addison Wesley, Third Edition, 2014.

Reference Book (s)

1	**Steven Harrington, "Computer Graphics: A Programming Approach" , McGraw-Hill Inc.,US; 2nd Revised edition, 1983.**

Unit-1 Introduction and Line Generation	9 hours
Introduction to Computer Graphics,Computer Graphics Applications, Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Midpoint circle generating algorithm, and parallel version of these algorithms.	
Unit-2 Two Dimensional	9 hours
Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms-Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.	
Unit-3Three Dimensional	9 hours
3-D geometric primitives- Parallel Projection, Perspective Projection, Depth Cueing, Visible Line and Surface Identification, Surface Rendering , 3-D Object representation- Polygon surfaces-Polygon Tables, Plane Equations, Polygon Meshes, curved lines and surfaces, 3-D Transformation, 3-D viewing, 3-D Clipping.	
Unit-4 Curves and Surfaces	9 hours
Quadric surfaces-Spheres, Ellipsoid, Blobby objects, Introductory concepts of Spline: Interpolation and approximation spline, Geometric Continuity Conditions, Spline Specifications, Parametric Continuity Conditions, Bspline and Bezier curves and surfaces.	
Unit-5 Surface Detection and Illumination models	9 hours
Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A-buffer method, Scan line method, basic illumination models – Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.	
Unit-6 Animation	**9 hours**
Design of Animation sequences, animation function, raster animation, key frame systems, motion specification, morphing.	

Programme Elective -III

Name of The Course	Microprocessor & Interfacing			
Course Code	BCSE3051			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	2	0	2	3

Course Objectives:

To Familiarize the students with the architecture of 8086

To introduce the concepts of Assembly language programming of 8086.

To make the students familiar with ICs required for interfacing 8086 with I/O devices

Course Outcomes

CO1	To understand architecture of 8086 processor
CO2	To design Assembly language program for 8086
CO3	To use advanced features of 8086
CO4	To interface 8086 with various devices and memory
CO5	To understand the architecture and principles of USART 8245

Text Book (s)
1. D.V. Hall, Microprocessors & Interfacing, TMH, 3rd edition
2. Barry B Brey, The intel microprocessor: architecture, programming and interfacing, Prentice hall of India, New Delhi, 2003.ISBN-0138027455, 4th Edition

Reference Book (s)
1. Alan Clements, “Principles of Computer Hardware”, Oxford University Press, 3rd Edition, 2003, ISBN-9780198564539

Course Contents:

Unit-1: Introduction 9 hours
History of microprocessors, Introduction of 8086, Functional diagram of 8086, Register Organization, Memory Segmentation, Programming Model, Memory addresses. Physical memory organization, signal descriptions of 8086- common function signals. Minimum and Maximum mode signals, Timing diagrams.
Unit II: Assembly Language Programming (Part-I) 9 hours
Instruction formats, addressing modes, instruction set, assembler directives, simple programs involving logical, branch and arithmetic expressions
Unit III : Assembly Language Programming (Part-II) 9 Hours
Procedures: Near and Far procedures, Macros, String Manipulations, searching and sorting programs, Advanced features of Assembly language programming
Unit IV : I/O Interface 9 Hours
8255 PPI, various modes of operation and interfacing to 8086, Interfacing keyboard, display, stepper motor interfacing, D/A and A/D converter, 8251 USART architecture and interfacing, RS- 232.
Unit V : Interfacing with memory & Interrupts 9 Hours
Memory interfacing to 8086, Interrupt structure of 8086, Vector interrupt table, Interrupt service routine. Introduction to DOS and BIOS interrupts, Interfacing 8259 Interrupt Controller, DMA Controller 8257.

Name of The Course	Data Science				
Course Code	BCSE3092				
Prerequisite	PYTHON BASICS, STATISTICS, LINEAR ALGEBRA				
Co requisite	DBMS, MACHINE LEARNING.				
Antirequisite					
	L	T	P	C	
	2	0	2	3	

Course Objectives:

The primary objective of this course is to develop both theoretical knowledge on data analysis skills, which can be applied to practical problems for explain how math and information sciences can contribute to building better algorithms and software. To develop applied experience with data science software, programming, applications and processes.

Course Outcomes

CO1	To acquire good introducing knowledge of the essentials in Statistical Fundamentals used in Data science.
CO2	An ability to apply algorithmic principles and Programing knowledge using Python language on Data Science .
CO3	Understand the fundamentals of statistics and probability used in data science.
CO4	To establish basic knowledge about optimization techniques in Data Virtualization.
CO5	Apply and Implement ML processing principles using Probability and Statistics .

Text Book (s)

1	Data Science from Scratch: First Principles with Python 1st Edition, by Joel Grus , O'Reilly Publication,2020.
2	James, G., Witten, D., Hastie, T., Tibshirani, R. An introduction to statistical learning with applications in R. Springer, 2013.
3	Han, J., Kamber, M., Pei, J. Data mining concepts and techniques. Morgan Kaufmann, 2011.

Reference Book (s)

1	"Data Science for business", F. Provost, T Fawcett, 2013
2	Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services , 2015.

Course Contents:

Unit-1: Introduction with Statistical Fundamentals 9 hours
Introduction : Intermediate Algebra& Linear Algebra: Functions, Exponentials and Logarithm's, Polynomial's, Alternate Coordinate systems, Binomial Distribution, Poisson distribution and Normal distribution its properties, Assumption of ANOVA, Measures of Central Tendency in Data.
Unit II: Python for Data Science 9 hours
Introduction about NumPy, Different NumPy Operations, Broadcasting with NumPy, Introduction about Pandas, Reading or Loading data into Data frame, Pandas Data Frame Manipulations, Data Loading /Reading in different formats(CSV,Excel,Json,HTML).
Unit III : Data Science with R 9 Hours
Intro to R Programming, Understanding data structures in R - lists, matrices, vectors, Basic Building Blocks in R, Basic Operations Operators and Types, Matrices and Data Frames in R, Logical Statements in R, Lapply, sapply, vapply and tapply Functions. Summarizing and Visualizing the Important Characteristics of Data.
Unit IV : Data Visualizations & Data Cleaning 9 Hours
Introduction to data Visualizations, Principles Behind Data Visualizations, Histograms-Visualize, Box plots-Visualize, the Distribution of Continuous Numerical Variables(Bar Plots Pie Chart Line Chart). Data Visualization using R- Line Plots and Regression.
Unit V : Statistics and Probability concepts to understanding Machine learning 9 Hours
Unsupervised Learning in Python: K- Means Theory/ Implementation, Quantifying K-Means Clustering Performance, Hierarchical Clustering Theory, Principal Component Analysis (PCA) theory / Implementation. Selection criteria for number of clusters choosing.

Name of The Course	Machine Learning			
Course Code	BCSE3093			
Prerequisite				
Co requisite				
Antirequisite				
	L	T	P	C
	2	0	2	3

Course Objectives

The objective of this course is to introduce the students about the knowledge of basic concepts of machine learning systems, types of learning etc.

Course Outcomes

At the end of the course students will be able to:

Understand learning systems.

Apply learning and classification algorithms.

Use regression techniques.

Apply unsupervised learning algorithms.

Understand reinforcement learning techniques.

Text Books

Tom M Mitchell, Machine Learning, McGraw Hill Education, McGraw Hill Education; First edition, 2017.

Bishop, C. (2006). Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.

Duda, Richard, Peter Hart, and David Stork. Pattern Classification. 2nd ed. New York, NY: Wiley-Inderscience, 2000. ISBN: 9780471056690.

Reference Books

Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995. ISBN: 9780198538646.

Introduction to Machine Learning - EthemAlpaydin, MIT Press, Prentice hall of India.

Patrick Henry Winston, Artificial Intelligence, 3rd Edition, AW, 1999.

Elaine Ric, Kevin Knight and Shiv Shankar B. Nair, Artificial Intelligence, 3rd edition, Tata McGraw Hill, 2009.

Course Content

Unit I: Introduction 8 Lecture hours

Basic concepts: Definition of learning systems, Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation

Unit 2 Learning and Classification 8 Lecture hours

Types of Learning: Supervised learning and unsupervised learning. Overview of classification: setup, training, test, validation dataset, over fitting. Classification Families: linear discriminative, non-linear discriminative, decision trees, probabilistic (conditional and generative), nearest neighbor.

Unit 3 Regression 8 Lecture hours

Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines: Optimal hyper plane, Kernels. Model selection and feature selection. Combining classifiers: Bagging, boosting (The Ada boost algorithm), Evaluating and debugging learning algorithms, Classification errors.

UNIT4 Unsupervised learning 9 Lecture hours

Clustering, K-means, EM Algorithm, Mixture of Gaussians, Factor analysis, PCA (Principal components analysis), ICA (Independent components analysis), latent semantic indexing, Spectral clustering, Markov models Hidden Markov models (HMMs).

UNIT-5 Reinforcement Learning 9 Lecture hours

MDPs. Bellman equations, Value iteration and policy iteration, Linear quadratic regulation (LQR). LQG, Q-learning, Value function approximation, Policy search, Reinforce, POMDPs

Theory			Practical		
Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	(Continuous Assessment) IA	ETE	Total Marks
20	15	30	15	20	100

Name of The Course	Data Mining and Warehousing				
Course Code	BCSE3094				
Prerequisite					
Co requisite					
Antirequisite					
		L	T	P	C
		2	0	2	3

COURSE OBJECTIVE: To gain knowledge on various Data Mining tasks, Data Warehousing and application oriented Data Mining concepts.

COURSE OUTCOME:

CO1: Knowledge in the basic concepts of data warehousing and data mining.
CO2: Ability to create large multidimensional data storage and carry out OLAP operations.
CO3: Ability to apply the concepts, algorithm, techniques and tools for developing practical applications.

Unit –I: Overview, Definition, Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture, Difference between Database System and Data Warehouse, Multidimensional Data Model, Data Cubes, Stars, SnowFlakes, Fact Constellations.

UNIT II: Data Warehouse Process and Technology: Warehousing Strategy, Warehouse /management and Support Processes, Warehouse Planning and Implementation, Hardware and Operating Systems for Data Warehousing, Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems, Distributed DBMS implementations, Warehousing Software, Warehouse Schema Design, 08

UNIT III Data Mining: Overview, Motivation, Definition & Functionalities, Data Processing, Form of Data Pre-processing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Discretization and Concept hierarchy generation, Decision Tree.

UNIT IV Classification: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms. Clustering: Introduction, Similarity and Distance Measures, Hierarchical and Partitioned Algorithms. Hierarchical Clustering- CURE and Chameleon. Density Based Methods DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method – Statistical Approach, Association rules: Introduction, Large Item sets, Basic Algorithms, Parallel and Distributed Algorithms, Neural Network approach.

UNIT V Data Visualization and Overall Perspective: Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse. Warehousing applications and Recent Trends: Types of Warehousing Applications, Web Mining, Spatial Mining and Temporal Mining

REFRENCES:

1. Alex Berson, Stephen J. Smith “Data Warehousing, Data-Mining & OLAP”, TMH

2. Mark Humphries, Michael W. Hawkins, Michelle C. Dy, “ Data Warehousing: Architecture and Implementation”, Pearson

3. I. Singh, Data Mining and Warehousing, Khanna Publishing House

4. Margaret H. Dunham, S. Sridhar,”Data Mining: Introductory and Advanced Topics” Pearson Education 5. Arun K. Pujari, “Data Mining Techniques” Universities Press

6. Pieter Adriaans, Dolf Zantinge, “Data-Mining”, Pearson Education

Name of The Course	Information Theory and Coding Techniques				
Course Code	BCSE3087				
Prerequisite	Mathematics, Basic Multimedia				
Corequisite					
Antirequisite					
		L	T	P	C
		2	0	2	3

Course Objectives:

The primary objective of this course is to introduce the topic of entropy, error control as a precise mathematical concept, and study how to arrange data establish their correctness, study their efficiency and memory needs. The course consists of a strong mathematical component in addition to the design of various multimedia.

Course Outcomes

CO1	Understand encoding and decoding of digital data streams.
CO2	Design an application with error–control.
CO3	Use compression and decompression techniques.
CO4	Apply the concepts of multimedia communication
CO5	. Design an application with error–control and convolutional code.

Text Book (s)

1	R Bose, “Information Theory, Coding and Crptography”, TMH 2007
2	Fred Halsall, “Multidedia Communications: Applications, Networks, Protocols and Standards”, Perason Education Asia, 2002

Reference Book (s)

1	K Sayood, “Introduction to Data Compression” 3/e, Elsevier 2017.
2	Gravano, “Introduction to Error Control Codes”, Oxford University Press 2015.
3	Amitabha Bhattacharya, “Digital Communication”, TMH 2016

Course Contents:

Unit-1: INFORMATION THEORY 9 hours
Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.
Unit II: SOURCE CODING: TEXT, AUDIO AND SPEECH 9 hours
Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 - Speech: Channel Vocoder, Linear Predictive Coding
Unit III : SOURCE CODING: IMAGE AND VIDEO 9 Hours
Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard
Unit IV : ERROR CONTROL CODING: BLOCK CODES 9 Hours
Dynamic programming with examples such as Knapsack, All pair shortest paths – Warshal's and Floyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.
Unit V : ERROR CONTROL CODING: CONVOLUTIONAL CODES 9 Hours
Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

Theory			Practical		
Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	(Continuous Assessment) IA	ETE	Total Marks
20	15	30	15	20	100

Programme Elective -IV

Name of The Course	Cloud Application Development				
Course Code	BCSE3096				
Prerequisite					
Co requisite					
Antirequisite					
	L	T	P	C	
	2	0	2	3	

Course Objectives:

The primary objective of this course is to introduce the topic of algorithms as a precise mathematical concept, and study how to design algorithms, establish their correctness, study their efficiency and memory needs. The course consists of a strong mathematical component in addition to the design of various algorithms.

Course Outcomes

CO1	Develop cloud based applications
CO2	To analyze and trouble shoot the problems while deploying application on cloud
CO3	Use web application based technologies for developing application using cloud
CO4	Use public cloud like IBM Bluemix, Amazon AWS, Google cloud platform or Microsoft Azure for developing an application
CO5	Deploy the application on real cloud

Text Book (s)

1	Chris Hay, Brian Prince, “Azure in Action” Manning Publications [ISBN: 978-1935182481],2010.
2	Henry Li, “Introducing Windows Azure” Apress; 1 edition [ISBN: 978-1- 4302-2469-3],2009
3	Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, MatiasWoloski, Developing Applications for the Cloud on the Microsoft Windows Azure Platform [ISBN: 9780735656062]

Reference Book (s)

1	Eugene Ciurana, Developing with Google App Engine [ISBN: 978-1430218319]
2	Charles Severance, Using Google App Engine [ISBN: 978-0596800697]

Course Contents:

Unit-1: Cloud Based Applications 9 hours
Introduction, Contrast traditional software development and development for the cloud. Public v private cloud apps. Understanding Cloud ecosystems – what is SaaS/PaaS, popular APIs, mobile.
Unit II: Designing Code For The Cloud 9 hours
Class and Method design to make best use of the Cloud infrastructure; Web Browsers and the Presentation Layer: Understanding Web browsers attributes and differences. Building blocks of the presentation layer: HTML, HTML5, CSS, Silverlight, and Flash.
Unit III : Web Development Techniques And Frameworks 9 Hours
Building Ajax controls, introduction to Javascript using JQuery, working with JSON, XML, REST. Application development Frameworks e.g. Ruby on Rails , .Net, Java API's or JSF; Deployment Environments – Platform As A Service (PAAS) ,Amazon, vmForce, Google App Engine, Azure, Heroku, AppForce
Unit IV : USE CASE 1 9 Hours
Building an Application using the LAMP stack: Setting up a LAMP development environment. Building a simple Web app demonstrating an understanding of the presentation layer and connectivity with persistence.
Unit V : USE CASE 2 9 Hours
Developing and Deploying an Application in the Cloud : Building on the experience of the first project students will study the design, development, testing and deployment of an application in the cloud using a development framework and deployment platform

Continuous Assessment Pattern:

Theory			Practical		
Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	(Continuous Assessment) IA	ETE	Total Marks
20	15	30	15	20	100

Name of The Course	Statistical Analysis using R				
Course Code	BCSE3086				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		2	0	2	3

Course Objectives: This is an introductory course on how to use the R programming language and software environment for data manipulations and munging, exploratory data analysis and data visualizations.

Course Outcomes

CO1	Understand the basic R programming.
CO2	Understand the basic frequency distribution.
CO3	Students will be familiar to the R ecosystem and learn how to use R for the most common data analysis tasks, including loading, cleaning, transforming, summarizing and visualizing data.
CO4	Interpretation of different error detection and correction.
CO5	Apply an advanced R programming ecosystem.

Text Book (s)

1	Ugarte, M.D., Militino, A.F., Arnholt, A.T. (2008). Probability and Statistics with R. CRC Press.
2	Peter Daalgard (2008). Introductory Statistics with R, Springer.
3	Thomas Rahlf (2017). Data Visualization with R: 100 Examples, Springer.

Reference Book (s)

1	The R statistical software program. Available from: https://www.r-project.org/.
2	RStudio an Integrated Development Environment (IDE) for R. Available from: https://www.rstudio.com/

Course Contents:

Unit-1: Introduction 9 hours
The basics of R- first steps in writing code; variables; functions; vectors; simple calculations. Working directory, reading and writing, loading and saving data, data frames. Vectors; matrices; indexing, Built-in Commands and Missing Data Handling.
Unit II: Frequency Distribution 9 hours
Objectives, Steps and Basic Definitions, Variables and Types of Data, Absolute Frequency, Relative Frequency and Frequency Distribution. Frequency Distribution and Cumulative Distribution Function.
Unit III : Visualization 9 Hours
Subdivided Bar Plots and Pie Diagrams, 3D Pie Diagram and Histogram-Kernel Density and Stem - Leaf Plots- Arithmetic Mean- Median- Quantiles-Mode, Geometric Mean and Harmonic Mean.
Unit IV : Error detection and correction. 9 Hours
Absolute Deviation and Absolute Mean Deviation- Range, Interquartile Range and Quartile Deviation-Mean Squared Error, Variance and Standard Deviation-Coefficient of Variation and Boxplots. Raw and Central Moments-Skewness and Kurtosis. Univariate and Bivariate Scatter Plots.
Unit V : R ecosystem. 9 Hours
Least Squares Method - R Commands and More than One Variables-Extending R with add-on packages and the R-ecosystem. Dynamic and web reporting: Knitr and Shiny. Running R as part of a business pipeline—the R terminal. Simulation I.

Continuous Assessment Pattern:

Theory			Practical		
Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	(Continuous Assessment) IA	ETE	Total Marks
20	15	30	15	20	100

Name of The Course	Block Chain Technology				
Course Code	BCSE3099				
Prerequisite	Programming and Data structures, Advanced Data structures and Algorithm				
Co requisite					
Antirequisite					
	L	T	P	C	
	2	0	2	3	

Course Objectives:

The primary objective of this course is to cover the technical aspects of crypto currencies, block chain technologies, and distributed consensus. The potential applications for Bit coin-like crypto currencies are enormous. The course will enable an individual to learn, how these systems work and how to engineer secure software that interacts with the Bit coin network and other crypto currencies.

Course Outcomes

CO1	Familiarise the functional/operational aspects of crypto currency ECOSYSTEM
CO2	Understand emerging abstract models for Blockchain Technology
CO3	Analyse the concept of bitcoin and mathematical background behind it
CO4	Apply the tools for understanding the background of crypto currencies
CO5	Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain

Text Book (s):

1. Melanie Swan, “Block Chain: Blueprint for a New Economy”, O’Reilly, 2015

2. Josh Thompsons, “Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging BlockChain Programming”

3. Daniel Drescher, “BlockChain Basics”, Apress; 1stedition, 2017

4. Anshul Kaushik, “BlockChain and Crypto Currencies”, Khanna Publishing House, Delhi.

5. Imran Bashir, “Mastering BlockChain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Packt Publishing

6. Ritesh Modi, “Solidity Programming Essentials: A Beginner’s Guide to Build Smart Contracts for Ethereum and BlockChain”, Packt Publishing

7. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O’Dowd, Venkatraman Ramakrishna, “Hands-On Block Chain with Hyperledger: Building Decentralized Applications with Hyperledger Fabric and Composer”, Import, 2018

Reference Book (s)

1	Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and crypto currency, IEEE Symposium on security and Privacy, 2015
2	J.A.Garay et al, The bitcoin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310.
3	R.Pass et al, Analysis of Block chain protocol in Asynchronous networks , EUROCRYPT 2017

Course Contents:

Unit I: Introduction	9 hours
The consensus problem - Asynchronous Byzantine Agreement - AAP protocol and its analysis - Nakamoto Consensus on permission-less, nameless, peer-to-peer network - Abstract Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS) .	
Unit II: Cryptographic fundamentals	9 hours
cryptographic basics for cryptocurrency - a short overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography	
Unit III: Bitcoin	9 Hours
Bitcoin - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bit coin.	
Unit IV: Ethereum	9 Hours
Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts.	
Unit V: Block chain-Recent trend	9 Hours
Zero Knowledge proofs and protocols in Block chain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves - Zcash.	

Name of The Course	Software Defined Network				
Course Code	BCSE3088				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		2	0	2	3

Course Objectives:

This course introduces software defined networking, an emerging paradigm in computer networking that allows a logically centralized software program to control the behaviour of an entire network.

Course Outcomes

CO1	Differentiate between traditional networks and software defined networks
CO2	Understand advanced and emerging networking technologies
CO3	Obtain skills to do advanced networking research and programming.
CO4	Learn how to use software programs to perform varying and complex networking tasks
CO5	Expand upon the knowledge learned and apply it to solve real world problems.

Text Book (s)

1	Software Defined Networks: A Comprehensive Approach by Paul Goransson and Chuck Black, Morgan Kaufmann Publications, 2014
2	SDN - Software Defined Networks by Thomas D. Nadeau & Ken Gray, O'Reilly, 2013
3	Software Defined Networking with OpenFlow By SiamakAzodolmolky, Packt Publishing, 2013.

Reference Book (s)

1	Feamster, Nick, Jennifer Rexford, and Ellen Zegura. "The road to SDN: an intellectual history of programmable networks." ACM SIGCOMM Computer Communication Review 44.2 (2014): 87-98.
2	Kreutz, Diego, et al. "Software-defined networking: A comprehensive survey." Proceedings of the IEEE 103.1 (2015): 14-76..

3	Nunes, Bruno AA, et al. "A survey of software-defined networking: Past, present, and future of programmable networks." Communications Surveys & Tutorials, IEEE 16.3 (2014): 1617-1634
4	Lantz, Bob, Brandon Heller, and Nick McKeown. "A network in a laptop: rapid prototyping for software-defined networks." Proceedings of the 9th ACM SIGCOMM Workshop on Hot Topics in Networks. ACM, 2010
5	Monsanto, Christopher, et al. "Composing software defined networks." Presented as part of the 10th USENIX Symposium on Networked Systems Design and Implementation (NSDI 13). 2013.
6	https://www.coursera.org/learn/sdn# http://www.cs.fsu.edu/~xyuan/cis5930/

Course Contents:

Unit I: Introduction to SDN 9 hours
SDN Origins and Evolution – Introduction – Why SDN? - Centralized and Distributed Control and Data Planes - The Genesis of SDN
Unit II: SDN Abstractions 9 hours
How SDN Works - The Open flow Protocol - SDN Controllers: Introduction - General Concepts - VMware - Nicira - VMware/Nicira - OpenFlow-Related - Mininet - NOX/POX - Trema - Ryu - Big Switch Networks/Floodlight - Layer 3 Centric - Plexxi - Cisco OnePK
Unit III : Programming SDN'S 9 Hours
Network Programmability - Network Function Virtualization - NetApp Development, Network Slicing
Unit IV : SDN Applications And Use Cases 9 Hours
SDN in the Data Center - SDN in Other Environments - SDN Applications - SDN Use Cases - The Open Network Operating System 3
Unit V : SDN'S Future And Perspectives 9 Hours
SDN Open Source - SDN Futures - Final Thoughts and Conclusions.

Practical/Training

	Course code	Industry Oriented Java III LTPC
	BCSE3074	0021
Days	Topics	Description
1	Building Java GUIs Using the Swing API	Describe the JFC Swing technology
		Identify the Swing packages
		· Describe the GUI building blocks: containers, components, and layout managers
		· Examine top-level, general-purpose, and special-purpose properties of container
		Examine components
		Examine layout managers
		Assessment
2	Event Handling	Define events and event handling including Keyboard Listener, Mouse Listener
		Assessment
3	Event Handling	Event Handling using ActionListener, ItemListener
		Assessment
4	UI	Introduction to web development. What is JEE, Key technologies in JEE, JEE application architecture
		Basic code of HTML4,HTML5 Validations with Javascripts
		Assessment
5	Servlet Basics	What is a servlet Servlet Lifecycle classes for handling request and response Simple servlet example Working with form data

6	Servlet Initialization	Initialization in init Initialization through ServletConfig Initialization through ServletContext
7	Servlet Communication	sendRedirect()Servlet communication forward() and include() Request Attributes
		Assessment
8	DataSource	Connecting to the database
		Assessment
9	Session handling	Session Introduction Ways to maintain state HttpSession, Session Destruction Internal working Session tracking API
		Assessment
10	JSP Basics	JSP introduction MVC JSP lifecycle Syntactic Elements of a JSP Page JSP scripting elements Implicit objects JSP directives
		Assessment
11	JSP Standard Action tags	Scriptlets JSP JSP Standard Action tags Java Bean <jsp:useBean> <jsp:forward>, <jsp:include>,<jsp:param>
		Assessment
12	Grand Test	

SLBT3031	English Proficiency and Aptitude Building -4	L	T	P	C
Version 1.0		0	0	4	2
Pre-requisites/Exposure	Completion of Semester 4				
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

Skill development related to classification of numbers

3. Implementing logical approach in decision making

Course Outcomes

At the end of this course, the learner will be:

4. Able to develop a logical thought process related to every aspect of life
5. Able to widen the horizon of one's thought process and data analysis skill
6. Able to interpret data and convert it into information

Text Books

SLLL own text book

Course Catalogue

It is imperative for a student to develop interpretation and analysis skills to be able to hold onto his own in this competitive world. The course thus, focuses on aptitude at the next level of reasoning and data interpretation.

Reference Books

3. Quicker Maths , M Tyra
4. Quantitative Aptitude, Abhijeet Guha

Semester VI

Name of The Course	Web Technology				
Course Code	BTCS3061				
Prerequisite	CSE121 - Object Oriented Programming, CSE312 – Database Management Systems				
Corequisite	CSE101 – Computer Programming and Problem Solving				
Antirequisite					
	L	T	P	C	
	2	0	2	3	

Course Objectives:
Acquire knowledge and skills for creation of web site considering both client and server side.
Gain ability to develop responsive web applications.
Acquire the knowledge to develop dynamic web pages.
Obtain the ability to develop server side application.

Course Outcomes

CO1	Understand the web development strategies and identify the problem
CO2	Develop the SRS document of the project
CO3	Design a visual representation of web application
CO4	Implement and establish database connectivity with front end.
CO5	Validate the web page using testing methodology

Text Book (s)
T1. Xavier, C, " Web Technology and Design" , New Age International Publishers.
T2. Uttam/Roy," WEB Technology", Oxford Publication.

Reference Book (s)
R1. IvanBayross -Web Enabled Commercial Application Development Using HTML, DHTML, Java Script, Perl, CGI-2000.
R2. Raj Kamal, “Internet and Web Technologies”, McGraw Hill Eduction.
R3. Jackson, “Web Technologies” Pearson Education
R4. Patel and Barik, ”Introduction to Web Technology & Internet”, Acme Learning.
R5. Steve Suehring, Tim Converse, Joyce Park, "PHP 6 and MySQL 6" WILLEY.

Unit-1 : Introduction to web and HTML	8 hours
Introduction to web, web development strategies, web team. HTML introduction: basic tag, elements, attributes, formatting, comments, marquee, list, table, images, frames, forms; Links : text, image and email. XHTML: Syntax and Semantics.	
Unit-2: CSS and XML	8 hours
CSS : color, background, fonts, images, link, table, margins, lists, border, paddings, scroll, class. CSS3 : border Image, round corner, text shadow, layers. XML: DTD, XML schemes, presenting and using XML.	
Unit-3: JAVA SCRIPT	8 hours
Java script: Introduction, documents, forms, statements, functions, objects; Event and event handling; Error handling; validation.	
Unit-4: JSP	8 hours
Java server pages (JSP), JSP application design, declaring variables and methods, debugging, sharing data between JSP pages, JSP objects, Session, development of java beans in Jsp, data base action with JSP.	
Unit-5: PHP	8 hours
PHP (Hypertext Pre-processor): Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form ,mail, file upload, session, error, exception, filter, PHP-ODBC.	

Unit VI: The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums. Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered in the course.

Theory			Practical		
Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	(Continuous Assessment) IA	ETE	Total Marks
20	15	30	15	20	100

Name of The Course	**Compiler Design**
Course Code	**BTCS3602**
Prerequisite	
Corequisite	
Antirequisite	

	L	**T**	**P**	**C**
	3	**0**	0	3

Course Objectives:

The goal of the course is to provide an introduction to the system software like assemblers, compilers, and macros. It provides the complete description about inner working of a compiler. This course focuses mainly on the design of compilers and optimization techniques. It also includes the design of Compiler writing tools. This course also aims to convey the language specifications, use of regular expressions and context free grammars behind the design of compiler.

Course Outcomes

CO1	Use language specifications behind the design of compiler.
CO2	Construct LL, SLR, CLR and LALR parsing table.
CO3	Evaluate different intermediate codes.
CO4	Implement different data structure and allocation schemes for symbol table.
CO5	Apply modern tools and technologies for designing new compiler.

Text Book (s)

1	Alfred V Aho, Jeffrey D. Ullman, “Principles of Compiler Design”, Narosa Publishing House, 2002.
2	Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools”, Addison Wesley; 2nd edition, 2006.

Reference Book (s)

1	V Raghvan, “Principles of Compiler Design”, TMH, 2011.
2	Kenneth Louden,” Compiler Construction”, Cengage Learning, 2002.
3	Charles Fischer and Ricard LeBlanc,” Crafting a Compiler with C”, Pearson Education,1991.

Contents:

Unit-1: Introduction 9 hours
Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Optimization of DFA-Based Pattern Matchers, implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.
Unit II: Basic Parsing Techniques 9 hours
Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR (0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, and implementation of LR parsing tables.
Unit III : Syntax Directed Translation 9 Hours
Syntax-directed Translation schemes, Implementation of Syntax directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declaration sand case statements.
Unit IV : Symbol Table 9 Hours
Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.
Unit V : Code Generation 9 Hours
Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code Generator. Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Programme elective V

Name of The Course	Object Oriented Analysis & Design			
Course Code	BTCS9502			
Prerequisite	Before you start proceeding with this tutorial, it is assumed that you have basic understanding of computer programming and related programming paradigms.			
Corequisite				
Antirequisite				
	L	T	P	C
	2	0	2	3

Course Objectives:
To understand the fundamentals of object modeling
To understand and differentiate Unified Process from other approaches.
To design with static UML diagrams.
To design with the UML dynamic and implementation diagrams.
To improve the software design with design patterns.
To test the software against its requirements specification

Course Outcomes

CO1	be able to use an object-oriented method for analysis and design
CO2	be able to analyse information systems in real-world settings and to conduct methods such as interviews and observations
CO3	know techniques aimed to achieve the objective and expected results of a systems development process
CO4	know different types of prototyping
CO5	know how to use UML for notation
CO6	Understanding of latest advances and its applications in Object Oriented analysis and Design.

Text Book (s)

1	**Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.**
2	**Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.**
3	**Mark Priestley: Practical Object-Oriented Design with UML,TATA McGraw-Hill**

Reference Book (s)

1	Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2	Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
3	Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.

Course Contents:

Unit I: UML DIAGRAMS 9 hours
Introduction to OOAD – Unified Process - UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.
Unit II: DESIGN PATTERNS 9 hours
GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller - Design Patterns – creational - factory method - structural – Bridge – Adapter - behavioural – Strategy – observer.
Unit III : CASE STUDY 9 Hours
Case study – the Next Gen POS system, Inception -Use case Modeling - Relating Use cases – include, extend and generalization - Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies - Aggregation and Composition.
Unit IV : APPLYING DESIGN PATTERNS 9 Hours
System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams - UML interaction diagrams - Applying GoF design patterns
Unit V : CODING AND TESTING 9 Hours
Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.
Unit VI: The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums. Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered in the course.

Name of The Course	**Software Project Management**
Course Code	**BTCS9503**
Prerequisite	
Corequisite	
Antirequisite	

	L	**T**	**P**	**C**
	2	0	2	3

Course Objectives:

Define and highlight importance of software project management.

Describe the software project management activities

Train software project managers and other individuals involved in software project.

Planning and tracking and oversight in the implementation of the software project management process

Course Outcomes

CO1	Describe and determine the purpose and importance of project management from theperspectives of planning, tracking and completion of project.
CO2	Compare and differentiate organisation structures and project structures.
CO3	Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

Text Book (s)

Clifford F. Gray, Erik W. Larson, "Project Management: The Managerial Process with MS",

Mc Graw Hill

Reference Book (s):

M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.

Royce, Software Project Management, Pearson Education

Kieron Conway, Software Project Management, Dreamtech Press

S. A. Kelkar, Software Project Management, PHI Publication.

Course Contents:

Unit I: Introduction and Software Project Planning 8 lecture hours
Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.
Module II: Project Organization and Scheduling 8 lecture hours
Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.
Module III: Project Monitoring and Control 8lecture hours
Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: 23 Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV),Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walk through, Code Reviews, Pair Programming.
Module IV: Software Quality Assurance and Testing 8 lecture hours
Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Clean room process.
Module V: Project Management and Project Management Tools 8 lecture hours

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Network Operating System			
Course Code	BTCS9504			
Prerequisite	Operating Systems			
Corequisite				
Antirequisite				
	L	T	P	C
	2	0	2	3

Course Objectives: To understand the advanced topics in the computer networks with more emphasis on the Internet architecture. To analyse the performance of different network functionalities.

Course Outcomes

CO1	To understand basic operating systems features, setup and management.
CO2	To understand the concepts involved in network operating system: REDHAT
CO3	To design network configuration by installing tools and packages.
CO4	Analyze various file systems and understand file server concepts.
CO5	Apply file server concepts in configuring server and its services
CO6	Understanding of latest advances and its applications in Network Operating Systems.

Text Book (s)

1	Cisco™ Networking Academy Program: HP IT Essentials II: Network Operating Systems, Second Edition, 2004.
2	Cisco™ Networking Academy Program: HP IT Essentials II: Network Operating Systems Journal and Workbook, Second Edition, 2004.
3	Bharat Bhusan, Understanding Linux , Khanna Publishing , Nai Sarak , New Delhi.

Reference Book (s):

1	Wale Soyinka, Linux Administration: A Beginner’s Guide, McGraw-Hill Osborne Media.

Unit-1 9 hours
Introduction to Operating Systems (Microsoft Windows, UNIX and Linux on the Desktop. Network Operating Systems Overview). Network Setup and Management including Hardware/Software configuration of Gateway, Routers, and Switches.
Unit-2 9 Hours
Network Operating System: Red Hat Linux, Installing Red Hat Linux. Preparing for installation. Booting from CD. Graphical Installation Launch. Setting disk partition levels. Setting Boot Loader, First Boot. Creation of User Account.
Unit-3 9 Hours
Connecting to Internet: Network Configuration Tool. Connecting to LAN. DNS. Installing Software: RPM. Meaning, RPM Management Tool. Adding & Removing Packages. Querying RPM Packages.
Unit-4 9 Hours
File System: What is File System. Anatomy of File System. File Permissions and Directories permissions. File Search Utilities. User Accounts: Super User Vs. Normal User. RedHat User Manager. Creating Groups. Server Role: Linux as Web Server. Apache Web Server. Installing Apache. Starting Apache. Configuring Web server. Setting up First Web Page.
Unit-5 9 Hours
FTP Server: Meaning, FTP Protocol. Installing vsftpd FTP Server. Starting FTP server. Testing FTP server. Using FTP server. Using FTP Client to Test Anonymous Read Access. File Server: Overview of Samba Server. Installing SAMBA server. Starting and Stopping the SAMBA server. SAMBA configuration with SWAT. Starting SWAT Service. Adding SAMBA User. Creating and Configuring SAMBA Share.
Unit VI: **The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums. Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered in the course.**

Course code BTCS8102	Project Management	Learning Schedule			
		L	T	P	C
	Pre-requisites: Software Engineering	3	0	0	3

COURSE DESCRIPTION

This course is an introduction to the basic processes of project management for instructional design projects. Students will be introduced to organizational issues, methods of planning, and techniques for managing the business and creative processes that determine the success of a project. Students will learn to use project management software for organizing, scheduling and monitoring project progress. The experiences provided in the class will provide “real-world” examples and ask students to apply and expand their student’s academic program of study. The overall purpose of the class is to blend theoretical aspects of project management to the pragmatic situations the student will face in industry or in academic environments. The outcome of the course will provide the foundation for developing technology-based project plans, management and experience in project management

COURSE OBJECTIVES

The objective of this course is to

define and highlight importance of project management

describe the project management activities

train software project managers and other individuals involved in project

planning and tracking and oversight in the implementation of the project management process.

COURSE OUTCOMES

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

describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project

compare and differentiate organization structures and project structures

implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

COURSE CONTENT

Unit I: Introduction and Software Project Planning

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

Unit II: Project Organization and Scheduling

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

Unit III: Project Monitoring and Control

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: 23 Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walk through, Code Reviews, Pair Programming.

Unit IV: Software Quality Assurance and Testing

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Clean room process.

Unit V: Project Management and Project Management Tools

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

TEXT BOOKS

"Project Management: The Managerial Process with MS" - Clifford F. Gray and Erik W. Larson, Mc Graw Hill

REFERENCE BOOKS

Software Project Management - M. Cotterell, Tata McGraw-Hill Publication.

Software Project Management - Royce, Pearson Education

Software Project Management - Kieron Conway, Dreamtech Press

Software Project Management - S. A. Kelkar, PHI Publication.

SLBT3002	Campus to Corporate	L	T	P	C
Version 1.01	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of Semester 5				
Duration	18 sessions of 100 minutes each				

Course Objectives

1. To assess the current employability level of students.
2. To prepare students to perform effectively in Personal Interview.
3. To prepare the students for solving mathematical problems appearing in Placement Papers.

Course Outcomes

At the end of this course, the learner will be:

1. Enhance and practice employability skills required in the placement process using a simulated environment
2. Communicate effectively in a Personal Interview
3. Model interpersonal communication in a monitored environment
4. Enhance the ability of problem solving and decision making in short span of time

Course Catalogue

Practice makes a man perfect – so says the wise man. The course in this semester focuses on the practicing soft skills in a simulated corporate environment providing thematic learning. The students prepare and practice participation in mock interviews – general, technical and HR, which provide a holistic environment for a student's final preparation. The students practice data analysis and reasoning skills for the purpose of solving complicated mathematical problems.

Text Book

SLLL own text book

Reference Books

1. Delivering Employability Skills in the Lifelong Learning Sector by Ann Gravells, ISBN-10: 1844452956
2. Sample Papers of Various companies
3. Real world HR interviews from companies across various sectors like IT, ITES, Manufacturing, etc. in and around NCR region.

Course Content

Unit I: Thematic Learning- Employability Skills- Job Fair — 12 lectures

- Introduction to Job Fair
- Resume Writing
- Personal Interview Concepts
- Mock Interviews
- Job Fair – Final Event

Unit II: Quantitative Aptitude — 6 lectures

- Syllogism
- Logical Reasoning
- Paper Pattern Discussion

Mode of Evaluation: The performance of students is evaluated as follows:

	Theory	
Components	Internal	SEE
Marks	50	50
Total Marks	100	

Course code BTCS8103	Managerial Economics	Learning Schedule			
		L	T	P	C
	Pre-requisites:	3	0	0	3

COURSE DESCRIPTION:

The course describes the basics of demand and demand forecasting. It explains cost functions, cost control, cost reduction and pricing techniques.

EXPECTED OUTCOME:

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

1. Apply the concept of demand.
2. Estimate production and cost function.
3. Formulate appropriate pricing strategies.

Unit I Introduction

Introduction: The Scope and Method of Managerial economics – Fundamental Economics concepts – Managerial Economics with other subjects - Objectives of the Firm

Unit II Demand and Supply Analysis

Meaning, Types and Determinants – Demand estimation- Demand elasticities for decision making – Business and Economic forecasting: Qualitative and Quantitative methods – Supply analysis: Meaning, elasticities and determinants – Market equilibrium and price determination

Unit III Production Economics

Production and Production function – Types – Estimation – Returns to Scale – Economies and Diseconomies of Scale and Economies of Scope. Factor Inputs - Input-Output Analysis

Unit IV Market Structure

Perfect Competition – Imperfect Competition: Monopoly – Monopolistic – Oligopolistic Strategy, Cartels, Cournot, Kinked Demand and Price Leadership. Oligopolistic Rivalry & Theory of Games – Measurement of economic concentration – Policy against monopoly and restrictive trade practices - Competition Law – Pricing Practices: Objectives – Determinants – Pricing Methods – Government Policies and Pricing.

Unit V Introduction to Macroeconomics

Circular Flow of Income and Expenditures – Components of National Income and its significance - Measuring Gross Domestic Product (GDP) – Inflation and Business Cycles – Government Fiscal and Monetary Policy - Balance of payments – Foreign exchange markets

TEXT BOOKS

1. P.L. Mehta – Managerial Economics Analysis, Problems and cases, Sultan Chand & Co. Ltd., 2001

REFERENCES:

1. Peterson and Lewis: Managerial Economics, 4th Ed., Prentice Hall , 2004

2. Dholakia and Oza: Microeconomics for Management Students, 2nd Edition, Oxford University Press

3. Gregory Mankiw: Principles of Microeconomics, Havcourt Asia Publishers, 2001

4. Mote and paul – Managerial Economics, Tata McGraw Hill, 2001

Semester VII

Course code	E-Commerce	Learning Schedule			
		L	T	P	C
	Pre-requisites: Web development	3	0	2	4

COURSE DESCRIPTION

This course introduces the concepts, vocabulary, and procedures associated with E-Commerce and the Internet. The student gains an overview of all aspects of E-Commerce. Topics include development of the Internet and E-Commerce, options available for do-ing business on the Internet, features of Web sites and the tools used to build an E-Commerce web site, marketing issues, payment options, security issues, and customer service.

COURSE OBJECTIVES

The objective of this course is to:

Discuss fundamentals of e-commerce, types and applications.

Evaluate the role of the major types of information systems in a business environment and their relationship to each other

Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business

Identify the major management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.

Learn strategies for e-commerce, Mobile Commerce, Wireless Application Protocol, WAP technology and Mobile Information devices.

COURSE OUTCOMES

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

Understand the basic concepts and technologies used in the field of management information systems

Understand the processes of developing and implementing information systems

Be aware of the ethical, social, and security issues of information systems and

Develop an understanding of how various information systems work together to accomplish the information objectives of an organization

Understand the role of information systems in organizations, the strategic management processes, and the implications for the management and learn about the importance of managing organizational change associated with information systems implementation

COURSE CONTENT

Unit I: INTRODUCTION

Definition of Electronic Commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, framework, Impact of E-commerce on business, E-Commerce Models.

Unit II: NETWORK INFRASTRUCTURE FOR E- COMMERCE

Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.

Unit III: WEB SECURITY

Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

Unit IV: ENCRYPTION

Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Triple encryption, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.

UNIT V: ELECTRONIC PAYMENTS

Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking.EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. poli-cies and Agenda.

TEXT BOOKS

Ravi Kalakota, Andrew Winston, “Frontiers of Electronic Commerce”, Addison Wesley.

REFERENCE BOOKS

Pete Lohsin , John Vacca “Electronic Commerce”, New Age International

Goel, Ritendra “E-commerce”, New Age International

Laudon, “E-Commerce: Business, Technology, Society”, Pearson Education

Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH

Turban, “Electronic Commerce 2004: A Managerial Perspective”, Pearson Education

Name of The Course	**Advanced Computer Networks**			
Course Code				
Prerequisite	Computer Networks			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	2	4

Course Objectives:
To understand the advanced topics in the computer networks, with more emphasis on the Internet architecture. To analyse the performance of different network functionalities.

Course Outcomes

CO1	**To understand advanced concepts of physical layer transmission media.**
CO2	Analyze various implementation concepts in congestion control and error detections
CO3	To understand wireless networks and the way access is controlled in these types of networks
CO4	Analyze various fields of mobile and social networks in different perspectives.
CO5	Design of cryptographic algorithms for Enterprise networks.

Text Book (s)

1	**Douglas E. Commerce, Internetworking with Principles, Protocols, Architecture. 6th Edition, 2013**
2	Andrew S. Tanenbaum, J.Wetherall, “Computer Networks” 5th Edition, 2010.
3	Thomas D. Nadeau, Ken Gray, SDN: Software Defined Networks 2013

Reference Book (s)

1	**J.F. Kurose and K.W. Ross, Computer networking: A top-down approach, 6th edition, Adison Wesley.**
2	L.L. Peterson and BS. Davie, Computer Networks ISE: A System Approach, 5th edition, Morgan Kaufman.
3	B.A. Frozen, Data communication & networking, 5th Edition, Tata Mc-Graw Hills.

Unit-1 9 hours
Introduction: Internet architecture and performance modeling: Review of Basic Network Architectures: OSI reference model, TCP/IP reference model, ATM reference model. Physical Layer: Different types of transmission media, and errors in transmission: attenuation, noise. Repeaters. Traffic Characterization (CBR, VBR);
Unit-2 9 Hours
Switching Paradigms; Multiplexing. Error Control, Flow Control, FTH, DTH, PON, ISDN, DSL, CATV, SONET, Optical Networks. Link. layer: switching, multiple access, error recovery: Data Link Layer MAC Layer: Local Area Network Technologies: Fast Ethernet, Gigabit Ethernet, IEEE 802.11 WLAN, Bluetooth, Connecting LANs, VLANS, STP.
Unit-3 9 Hours
Network Device, Routing algorithms, BGP, Advanced routing concepts, Router architectures, internetworking: Inter domain Routing, BGP, IPv6, Multicast Routing Protocols, Multi Protocol Label Switching, and Virtual Networks. Transport layer Transport protocols, TCP mechanics, congestion control, resource allocation UDP mechanics. Socket Programming.
Unit-4 9 Hours
Overlay networks: RON, P2P, CDN, Web caching, cross-layer optimizations, Emerging network types: data centre, DTN, 4G mobile networks (LTE, Wi-Max), Online social networks (OSN), wireless sensor networks (WSN) – cross-layer sensor data dissemination
Unit-5 9 Hours
Internet Telephony- 1st Generation Protocols, Compression Techniques, 2nd Generation Systems, H.320 Standards, Directory Systems, IRC, LDAP, Integration with the PSTN, Gateways, VoIP Consortium, ETSI TIPHON-Skype-Enterprise Network Security, SNAT, DNAT.
Unit VI: The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums. Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered in the course.

Name of The Course	Enterprise Resource Planning			
Course Code				
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	2	4

Course Objectives:
Describe the concept of ERP and the ERP model; define key terms; explain the transition from MRP to ERP; identify the levels of ERP maturity.
Explain how ERP is used to integrate business processes; define and analyze a process; create a process map and improve and/or simplify the process; apply the result to an ERP implementation.
Describe the elements of a value chain, and explain how core processes relate; identify how the organizational infrastructure supports core business processes; explain the effect of a new product launch on the three core business processes.

Course Outcomes

CO1	Develop model for ERP for large project
CO2	Develop model for E-commerce architecture for any application
CO3	Describe the advantages, strategic value, and organizational impact of utilizing an ERP system for the management of information across the functional areas of a business: sales and marketing, accounting and finance, human resource management, and supply chain.
CO4	Demonstrate a working knowledge of how data and transactions are integrated in an ERP system to manage the sales order process, production process, and procurement process.
CO5	Evaluate organizational opportunities and challenges in the design system within a business scenario.

Text Book (s)
Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning –
Concepts and Practice”, PHI.
Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource
Planning”, Thompson Course Technology.
Reference Book (s):
Alexis Leon, “ERP Demystified”, Tata McGraw Hill
Rahul V. Altekar “Enterprise Resource Planning”, Tata McGraw Hill,
Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – A Concepts and Practice”, PHI.

Course Contents:

Unit I: 8 lecture hours
ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, the Evolution of ERP, the Structure of ERP.
Unit II: 8 lecture hours
Business Process Reengineering, 16SCSE101084, Data Mining, Online Analytic Processing (OLAP), Product Life Cycle Management (PLM), LAP, Supply chain Management.
Unit III: 8 lecture hours
ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, the Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications.
Unit IV: 8 lecture hours
ERP Implementation Basics, ERP Implementation Life Cycle, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.
Unit V: 8 lecture hours
ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. Using ERP tool: either SAP or ORACLE format to case study.
Unit VI: The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums. Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered in the course.

Name of The Course	Deep Learning			
Course Code				
Prerequisite				
Co requisite				
Antirequisite				
L	T	P	C	
3	0	2	4	

Unit I: Basics: Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.

UNIT-II: Feedforward Networks & Deep Neural Networks: Difficulty of training deep neural networks, Greedy layer wise training. Multilayer Perceptron, Gradient Descent, Back propagation, Empirical Risk Minimization, regularization, auto encoders.

Unit –III: Better Training of Neural Networks: Newer optimization methods for neural networks (Adagrad, ad delta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

Unit –IV: Recurrent Neural Networks: Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs, Convolutional Neural Networks: LeNet, AlexNet.

Unit –V Generative models: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.

Recent trends: Variational Auto encoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning

Unit VI: The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums. Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered in the course.

Course Code:	BANKING AND INSURANCE INDUSTRY	L	T	P	C
Version: XXX	Date of Approval:	3	0	0	3
Pre-requisites//Exposure	Knowledge of business analytics and basic idea about financial sector				
co-requisites					

Course Objectives

The objective of this course is to:

Getting concrete knowledge on how analytics is applicable in banking and finance sector

Familiarize with analytics modelling

Getting idea about big data analytics for financial services

Familiarize with analytics applications in finance sector

Course Outcomes

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

Understand the basics of analytics modelling

Understand the impact of analytics in banking sector

Familiarize with financial services in analytics

Apply thebig data analytics for financial services

Familiarize with the analytics applications in financial services

Design and implement the analytical services for banking and finance sector

Course Description

This course is designed to help student to learn about how the analytics is applied in banking and finance sector. This will explained the impact of analytics in the financial services. Further, some advance concept like, big data analytics on finance will be explained.

Text Books

Analytics in Banking and Insurance Industry (IBM ICE Publication), Edition 1.0, 2013

Reference Books

Analytics for Insurance: The Real Business of Big Data- Tony Boobier, The Wiley Finance Series ,2016

A Primer in Financial Data Management, Martijn Groot, Academic Press, 2017

http://www.genpact.com/docs/default-source/resource-/analytics-in-insurance

http://www.genpact.com/docs/default-source/resource-/analytics-in-banking

http:// https://www.exastax.com/big-data/top-7-big-data-use-cases-in-insurance-industry

http:// www.ibm.com/services/multimedia/Insuranceintheageofanalytics.pdf

Course Content

Unit I: Introduction to Analytics Modelling 6 Lecture hours

Fundamental analytics models and methods, How to use analytics software, including R, to implement various types of models, Understanding of when to apply specific analytics models

Unit II: The role and impact of analytics in Banking 6 Lecture hours

Reporting, Descriptive Analytics, Predictive analytics, Prescriptive Analytics, Consumer behavior and marketing analytics, Risk Fraud AML/KYC Analytics, Product and portfolio optimization modelling, operationalizing Analytics in banking

Unit III: Financial Services Analytics 5 Lecture hours

Generating Financial Services Analytics Impact, Financial risk modelling, Risk analytics, Data analytics strategy and organization, Data analytics technology, Fractal Analytics

Unit IV: Big data Analytics for Financial Services 6 Lecture hours

Get a Competitive Advantage with Big Data, Build analytics capabilities based on business priorities, Information integration, scalable storage infrastructure, high capacity warehouse, security and governance, scripting and development tools, columnar databases, Analytic accelerators, Hadoop/MapReduce

Unit V: Analytics Applications in Financial Services 5 Lecture hours

Micro strategy, Enterprise risk management, Performance analysis, Sales enablement, Customer insight analysis, product analysis, case studies

Mode of Evaluation: Class Quiz, Assignment, CAT -1, CAT – 2 and ETE.