GALGOTIAS UNIVERSITY

Syllabus of

Course Book B.Tech. (CSE) 2015-16

Name of School: School of Computing Science and Engineering

Department: Computer Science and Engineering

Year: 2015-16

daYear :	2015-16 batch (1st Semester)					
Subject Code		**Name of the Course**	**Teaching Scheme**			**Credits**
			L	**T**	**P**	
Theory						
1	LLL111	Basic English	3	0	0	3
2	MAT111	Matrices & Multivariable Calculus	3	1	0	4
3	PHY111	Modern Physics	3	0	0	3
4	CHY111	General Chemistry	3	0	0	3
5	EEE101/CSE 101	Basic Electrical and Electronics Engineering / Computer Programming and Problem Solving	3	0	0	3
6	GER101/FRE101/JAP101 OR HUM201	German/French/Japanese Language OR Psychology & Sociology	0	0	4	2
7	EVS 102 OR LLL101	Environmental Science & Energy/Universal Human Values and Ethics	3	0	0	3
8	MEE151/MEE152	Engineering Graphics /Workshop Practice	0	0	4	2
Practical						
1	*PHY151*	*Physics Lab I*	0	0	2	1
2	*CHY151*	*Engineering Chemistry- 1 Lab*	0	0	2	1
3	*EEE151/CSE 151*	*Basic Electrical and Electronics Engineering Lab (6)/Computer Programming and Problem Solving Lab(3)*	0	0	2	1
		Total:	**18**	**1**	**14**	**26**

Year :	2015-16 batch (2nd Semester)					
Subject Code	**Name of the Course**	**Teaching Scheme**			**Credits**	
		L	**T**	**P**		
Theory						
1 LLL121	English proficiency	0	0	4	2	
2 MAT121	Ordinary Differential Equations And Integral Transforms	3	1	0	4	
3 PHY121	Condensed Matter Physics	3	0	0	3	
4 CHY121/CHY122/CHY123/CHY124	Biological Chemistry/Nano Science & Nano Technology/Organic Chemistry/Physical Chemistry	3	0	0	3	
5 GER101/FRE101/JAP101 OR HUM201	German/French/Japanese Language OR Psychology & Sociology	0	0	4	2	
6 EEE101/CSE 101	Basic Electrical and Electronics Engineering / Computer Programming and Problem Solving	3	0	0	3	
7 MEE151/MEE152	Engineering Graphics /Workshop Practice	0	0	2	1	
8 EVS 102 OR LLL101	Environmental Science & Energy /Universal Human Values and Ethics	3	0	0	3	
Practical						
1 *EEE151/CSE 151*	*Basic Electrical and Electronics Engineering Lab (6)/Computer Programming and Problem Solving Lab*	0	0	2	1	
2 PHY 141	Physics Lab II	0	0	2	1	
3 CHY 141	Chemistry –II Lab	0	0	2	1	
	Total:	**15**	**1**	**16**	**24**	

Year :	2015-19 batch (3rd Semster)					
Subject Code		**Name of the Course**	**Teaching Scheme**			**Credits**
			L	**T**	**P**	
Theory						
1	CSE211	Discrete Structure	3	0	0	3
2	LLL213	English proficiency & aptitude Building-II	0	0	4	2
3	MAT211	Partial Differential Equations & Complex Analysis	3	1	0	4
4	CSE212	Data Structures and Algorithms	3	0	0	3
5	CSE214	Data Communication	3	0	0	3
6	CSE121	Object oriented programming	3	0	0	3
7	CSE216	Digital Design	3	0	0	3
Practical						
1	CSE252	Data Structures and Algorithms Lab	0	0	2	1
2	CSE256	Digital Design Lab	0	0	2	1
3	CSE141	Object oriented programming Lab	0	0	2	1
		Total:	**18**	**1**	**10**	**24**

Year :	2015-19 batch (4th Semester)					
Subject Code		**Name of the Course**	**Teaching Scheme**			**Credits**
			L	**T**	**P**	
1	MAT221	Numerical Methods	3	0	0	3
2	CSE213	Computer Architecture and Organization	3	0	0	3
3	CSE221	Theory of Automata and Formal Languages	3	1	0	4
4	CSE222	Operating System	3	0	0	3
5	CSE312	Database Management Systems	3	0	0	3
6	MGT302	Industrial Economics and Management	3	0	0	3
Practical						
1	CSE242	Operating System Lab	0	0	2	1
2	CSE352	Database Management Systems Lab	0	0	2	1
3	MAT252	Numerical Methods Lab	0	0	2	1
4	LLL222	English Proficiency and Aptitude Building -3	0	0	4	2
		Total	**18**	**1**	**10**	**24**

Year:		2015-19 batch (5th Semester)					
Subject Code			Name of the Course	Teaching Scheme			Credits
				L	T	P	
1	CSE311		Design and Analysis of Algorithms	3	0	0	3
2	CSE313		Compiler Design	3	0	0	3
3	CSE314		Computer Networks	3	0	0	3
4	CSE322		Software Engineering	3	0	0	3
5	EMP131		Operating System & Computer Networks	0	0	2	1
6	EMP132		Java Programming- Basics	0	0	2	1
Elective-01							
7	CSE123		Web Programming through PHP & HTML	3	0	0	3
	CSE200		Programming in Python	3	0	0	3
	CSE461		Introduction to Cloud Computing	3	0	0	3
	CSIO101		Introduction to IOT	3	0	0	3
	CSE372		Wireless and mobile computing	3	0	0	3
	CSE301		App Development for Android	3	0	0	3
Practical							
8	CSE351		Design and Analysis of Algorithms Lab	0	0	2	1
9	CSE353		Compiler Design Lab	0	0	2	1
10	CSE354		Computer Networks Lab	0	0	2	1
11	CSE342		Software Engineering Lab	0	0	2	1
12	LLL312		English Proficiency and Aptitude Building -4	0	0	4	2
			Total:	**15**	**0**	**16**	**23**

Year:	2015-19 batch (6th Semester)					
Subject Code		Name of the Course	Teaching Scheme			Credits
			L	T	P	
1	CSE321	Data Mining and Data Warehousing	3	0	0	3
2	CSE220	Microprocessor and Interfacing	3	0	0	3
3	CSE323	Computer Graphics	3	0	0	3
4	CSE411	Software Testing Methodologies	3	0	0	3
5	EMP133	Advanced Java Programming	0	0	2	1
6	EMP134	MangoDB	0	0	2	1
Programme Elective -II & III						
7&8	CSE361	Data Compression	3	0	0	3
	CSE360	Artificial Intelligence	3	0	0	3
	CSE362	Soft Computing	3	0	0	3
	CSE374	Software Project Management	3	0	0	3
	CSE420	Big Data Analytics	3	0	0	3
	CSE 461	Introduction to Cloud Computing	3	0	0	3
Practical						
9	CSE451	Software Testing Methodologies Lab	0	0	2	1
10	CSE343	Computer Graphics Lab	0	0	2	1
11	CSE240	Microprocessor and Interfacing Lab	0	0	2	1
12	LLL322	Campus-to-Corporate	0	0	4	2
		Total:	15	0	14	25

Year :	2015-19 batch (7th Semester)					
Subject Code		Name of the Course	Teaching Scheme			Credits
			L	T	P	
1	CSE412	Web Technology	3	0	0	3
2	CSE522	Mobile Computing	3	0	0	3
3	CSE401	Network security	3	0	0	3
Programme Elective -IV &V						
4&5	CSE606	Big Data Analytics for IOT	3	0	0	3
	BCSE9003	Big Data Technology	3	0	0	3
	CSIO101	Introduction to IOT	3	0	0	3
	BSE9009	Artificial Intelligence and Intelligent System	3	0	0	3
	BCSE9002	Cloud Application Development	3	0	0	3
	CSE200	Programming in Python	3	0	0	3
	BCSE9004	Programming for data analysis	3	0	0	3
Practical						
6	CSE452	Web Technology Lab	0	0	2	1
7	CSE320	Industrial Internship	0	0	4	2
8	CSE453	Project 1 (Domain Based)	0	0	10	5
		Total:	**15**	**0**	**16**	**23**

Semester-8						
S. No.	Course Code	Course Title	L	T	P	Credits
Practical						
1	CSE421	Project 2	0	0	30	15
		Total:				

Total Credits   **184**

DETAILED SYLLABUS

I-   **SEMESTER**

LLL111	Basic English	2	0	2	3
Version No.	1.0				
Prerequisite	+ 2 level English				
Objectives:	The objective of the course is to 1. help the second language learners to acquire fluency in spoken and written English. 2. enable students communicate with clarity and precision in the workplace. 3. give the students a perspective to appreciate life in its variables by exposing them to comprehension texts to enrich their word power. 4. enable students to acquire structure and written expression required for their profession.				
Expected Outcome:	The students will get the required training in LSRW through theprescribed texts.				
Module I					
Communication Skills	Aspects of Communication				
Textual	'The Tunnel', 'The Imp and the Crust'				
Structure and Word Magic	Tenses, Concord, Tag Question; Word formation				
Stylistic Expression	Paragraph Writing, Cloze test, Formal letter writing				
Module II					
Communication Skills	Interpersonal Communication Skills at Work and Study (Emphasis on Listening)				
Textual	'The Bet', 'The Gift of the Magi'				
Structure and WordMagic	Voice Change, Conditional Sentences, Transformation of sentences				
Stylistic Expression	General Essay				
Module III					
Communication Skills	Group discussion (Emphasis on Speaking)				

Textual	'The Canterville Ghost', 'The Travels of Scarementado'
Structure and WordMagic	Change in Narration
Stylistic Expression	Expansion
Text Books	

1. Wren and Martin, High School English Grammar and Composition
2. C. Muralikrishna and S. Mishra, Communication Skills for Engineers.

References	

1. P. D. Chaturvedi, M. Chaturvedi, Business Communication: Concepts, Cases And Applications
2. Murphy, Essential English Grammar, CUP.
3. J S Nesfield, English Grammar: Composition and Usage
4. B. Mishra, S.Sharma, Communication Skills for Engineers and Scientists

Mode of Evaluation	Writing and speaking skills, tests, quizzes, assignments and seminars
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

MAT111	**Matrices & Multivariable Calculus**	L 3	T 1	P 0	C 4
Version No.	1.0				
Prerequisite	*Prerequisite: Basic concepts on Single variable calculus and Matrices.*				
Objectives:	Objective: The objective of this course is to give an exposure of elementary tools in linear algebra and multivariable calculus to the engineering students enrolled in first semester which is useful in formulation and solution of various engineering problems. The application in each module gives an understanding ofusing these tools in some engineering problems				
Expected Outcome:	*On completion of this course students will* *1. Become familiar with the terminology related to matrices , know the use of matrices in solving a system of linear equations using matrices and be able tocompute the eigen values and eigen vectors of a matrix.* *2. Be able to compute the partial derivatives of the functions with more thanone variable and know their applications.* *3. Be able to Integrate a function up to three variable and know the relatedapplications.* *4. Be able to differentiate between scalar and vector point function.* *5. Know the application of multiple integrals in vector point function with orwithout the use of related theorem.*				
Module I	Matrices & its Applications				

Matrices & its Applications: Elementary transformations and Elementary matrices, Inverse of Matrix using Elementary Transformations, Normal form of a matrix, Linear dependence and independence of vectors, Rank of a matrix, Solution of system of Linear Equations, Linear and Orthogonal transformations, Definition ,Properties and computation of Eigen values and Eigenvectors, Cayley - Hamilton theorem and its applications.

Module II	Single and Multivariable Differential Calculus		

Single and Multivariable Differential Calculus: Successive differentiation, Leibnitz Theorem and applications, Limit, continuity and differentiability of function of two or more variables, Partial derivatives of all order, total differential, derivatives of composite and implicit functions, Jacobians, Euler's Theorem for homogenous functions and applications, Taylor's and Maclaurin's series for functions of one and two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, Leibnitz rule of differentiation under integral sign.

Module III	Single and Multivariable Integral calculus		

Single and Multivariable Integral calculus: Asymptotes, Curve Tracing, Beta and gamma functions, Double integral in Cartesian and polar coordinates, Change of order of integration, applications of double integral to find area enclosed by plane curves, triple integral, change ofvariables in double and triple integrals , volume of solid by triple integral

Module IV	Vector Calculus:	

Vector Calculus: Scalar and vector point functions, Differentiation of Vector point function, Gradient of a scalar field and directional derivative, divergence and curl of a vector field and their physical interpretations. Integration of vectors, line integral, surface integral, volume integral, Application of Green, Stoke's and Gauss theorems (without proof) .

Reference Books:	

1. Calculus and Analytic Geometry : *G. B. Thomas, R. L. Finney*, Pearson Education, Asia.

2. Advanced Engineering Mathematics : *Michael D. Greenberg*, Pearson Education, Asia

3. Advanced Engineering Mathematics :E. Kreyszig, John Wiley &Sons.

4. Higher Engineering Mathematics   : *B. S. Grewal,* Khanna Publications.

		Modern	L	T	P	C
PHY 111		Physics	3	0	2	4
Version No.	1.0					
Prerequisite	Physics as one subject in 12th Standard or equivalent level.					
Objectives:	The objective of teaching the engineering physics to engineering student to inculcate the basic ideas about the events existing around us which helps to better understanding about engineering subject in further classes.					
Expected Outcome:	At the end of the course, students will acquire the necessary knowledge about modern physics and its applications in various engineering andtechnology disciplines					

Module I	Quantum Physics

Dual Nature of Electro-magnetic radiation, de-Broglie waves, Devisson & Germer Experiment(Experimental verification of de-Broglie waves), Heisenberg Uncertainty Principle and its Applications, Schrodinger's wave equations, Particle in a Box, Compton Effect, Spectroscopic
Applications of Quantum Mechanics : AFM and STM.

Module II	Laser Application

Laser Characteristics, Einstein's co-efficients, Population Inversion, Schawlaw and Townes condition for three level and four level laser, Nd-YAG, He-Ne, and CO_2 laser. Application of lasers :
Industrial & Medical, Optical Disc System : Recording and read out data from optical disc, Holography : construction and reconstruction of images, Problems.

Module III	Fiber Optics

Acceptance angle, Numerical aperture, Type of fibers : Step Index, Graded index, Single mode and
multimode fiber, Attenuation, Dispersion, Application of fiber optic in communication, Sources forfiber communication : LED, Diode laser, PIN photo diode.

Module IV	Ultrasonic and Microwave

Properties, Generation : Magnetostriction method and Piezo-electric method, Detection and
applications of ultrasonic wave. NDT Characteristic features of microwaves : TE & TM modes,Klystron-Gunn diode, Applications of Microwave.

Module V	Nano Technology

Nanoscale materials, Properties of nanomaterials, Moore's law, Semiconductor nanomaterials,
Nanocomposites, Quantum well, Quantum wire, Quantum dots, Nanolithography, Applications of nanotechnology : Aerospace components, sensors, medicine.

Reference Books	

1. B.B. Laud, Lasers and Non-Linear Optics, 2nd Edition, New Ages International.
2. Ghatak and K. Thyagarajan (2002), Introduction to Fiber Optics, Cambridge University Press.
3. William Silfvast (2002), Laser Fundamentals, Cambridge University Press.
4. Djafar K. Mynbaeu (2004), Fibre Optic Communication Technology, Pearson Education Asia.
5. Kittel (2001), Solid State Physics, 7th Edition, John Wiley & Sons.
6. K.C. Gupta (2002), Microwaves, New Age International.
7. Arthur Beiser (2003), Concepts of Modern Physics, 6th Edition, Tata-McGraw Hill.
8. Charles P. Poole, Jr. and Frank J. Owens (2003), Introduction to Nanotechnology, John Wiley& Sons.
9. Edward L. Wolf (2006), Nano Physics and Nanotechnology – An introduction to ModernConcepts in Nanoscience, Wiley VCH verlagambh & Co., Weinheim.

Mode of Evaluation	Written Examinations, Quizzes, Assignments,

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

CHY111	General Chemistry	3	0	2	4

Version No.	1.0
Prerequisite	Basic Chemistry at 12th Standard or equivalent level.
Objectives:	1. To impart technological aspects of modern chemistry 2. To lay foundation for the application of chemistry in engineeringand technology disciplines
Expected Outcome:	At the end of the course, the students will be familiar with the fundamentals of water technology; corrosion and its control; applications of polymers in domestic and engineering areas; types of fuels and their applications; and recent trends in electrochemical energy storage devices.
Module I	

Hardness of water: Hard and soft water, Modules of Hardness (numerical problems). Disadvantages of hard water: Scale and sludge, caustic embrittlement, priming and foaming, corrosion. removal of silica, Estimation of hardness: EDTA, alkali titration method (numerical problems). Alkalinity, (numerical problems), Softening methods: Lime soda process, Hot and cold soda lime process, zeolite, ion exchange, mixed bed deionizer, treatment of municipal water. Desalination: Desalination of sea water, brakish water, electro dialysis, reverse osmosis.

Module II	Corrosion & Corrosion Control

Corrosion: Types and causes of corrosion, theories of Corrosion. factors influencing corrosion, corrosion inhibitors. Corrosion control: Protective coatings, electroplating, metal finishing, physical vapour deposition, chemical vapour deposition. High energy coating processes: Ion implantation.

Module III	Polymers

Classification of polymers: Thermoplastics, thermosetting plastics - properties and industrial applications of important thermoplastic, thermosetting plastics. Different mechanism of polymer synthesis: addition and condensation polymerization. Conducting polymers: Properties and applications - biodegradable polymers

Module IV	Fuels and Combustion

Fuels: Classification of fuels, calorific value - LCV, HCV; measurement of calorific value using bomb calorimeter (numerical problems). Combustion: Calculation of air qualities (problems). Solid fuel, proximate and ultimate analysis (problems). Carbonization of coal. Liquid Fuels: Knocking and anti- knocking for petrol and diesel (octane number and cetane number) - diesel index. Refining of liquid fuels, cracking of petroleum. Gaseous fuels: LPG, natural gas, CNG: Composition and applications.
Biofuels: Biodiesel and Biogas -composition and applications. Next generation fuels.

Module V	Electrochemical Energy systems

Electrochemical energy systems: Basic concepts of electrochemistry and electrochemical energy systems. Conventional primary batteries: Dry cell. Advanced primary batteries: Lithium and alkaline primary batteries. Conventional secondary batteries: Lead-acid, nickel-cadmium secondary batteries. Advanced secondary batteries: Nickel-Metal hydride and lithium-ion secondary batteries. Fuel cells: Key issues – Hydrogen-oxygen fuel cells - new generation fuel cells
– electric vehicle application – solid oxide fuel cells.

Text Books	

1. P.C. Jain and M. Jain (2006), Engineering Chemistry, 15th Edition, Dhanpat Rai PublishingCo., New Delhi
2. S.S. Dara (2006), A Text book of Engineering Chemistry, 11th Revised Edition, S. Chand & Co
   Ltd., New Delhi.

References	

1. B.R. Puri and L.R. Sharma (2004), Principles of Physical Chemistry, 27th Edition, VishalPublishing Co.
2. J.C. Kuriacose and J. Rajaram (1996), Chemistry in Engineering and Technology, Vol. 1, Tata McGraw-Hill Publishing Company, New Delhi.
3. David Linden (2002), Hand Book of Batteries, 3rd Edition, McGraw Hill Publishers

Mode of Evaluation	Written Examinations, Quizzes, Assignments,
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

EEE101	Basic Electrical and Electronics Engineering	L 3	T 0	P 2	C 4
Version No.	1.0				
Prerequisite	Physics at +2 or equivalent level				
Objectives:					
Expected Outcome:					
Module I	Elementary Circuit Analysis				
Ohm's law, KCL, KVL, node voltage analysis, mesh current, circuits with independent sources, Thevenin's &Norton's equivalent, maximum power transfer and superposition theorem.					
Module II	Analysis of DC and AC Circuits				
Steady state DC analysis, RL and RC transients in circuits with DC source, RMS values, the useof phasors forconstant frequency sinusoidal sources, steady state AC analysis of a series circuit, series and parallel combinations of complex impedances, AC power calculations.					
Module III	Digital Systems				
Basic logic circuit concepts, Basic Gates and Universal Gates, representation of numerical data in binary form – Binary to decimal, Octal, Hexadecimal, Boolean algebra, combinational logic circuits-Half adder, full adder, synthesis of logic circuits, minimization of logic circuits - sequential logic circuits - computer organization, memory types, analog to digital conversion.					
Module IV	Semiconductor Devices				
Basic diode concepts, ideal diode model, rectifier and wave-shaping circuits, zener diode voltage regulator concepts, bipolar junction transistors, current and voltage relationship, common emitter characteristics, basic amplifier concepts, cascaded amplifiers, ideal amplifiers, differential amplifiers, JFET, CMOS- NMOS and PMOS transistors, ideal operational amplifiers, inverting and non-inverting amplifiers, integrators & differentiators.					
Module V	Electro-mechanics				
Ideal and real transformers, principles of rotating DC machines, shunt, separately excitedand series connectedDC motors, speed control of DC motors, Three phase induction motors, synchronous machines and single phase induction motors.					
Text Books					
1. D.P. Kothari and I.J. Nagrath , "Basic Electrical Engineering", 2nd Edition, TataMcGraw-Hill, 2002. 2. V.Mittle, Arvind Mittle, "Basic Electrical Engineering", McGraw Hill, 2005.					

	3. Robert L.Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education, 2007. 4. A.P.Malvino, Donald Leach, "Digital Principles and Applications", 6th Edition, TataMcGraw Hill, 2006.
Reference Books	
	1. D.C.Kulshreshtha,"Basic Electrical Engineering", Tata McGraw Hill, 2009. 2. J. Edminister and M. Nahvi , "Electric Circuits", 3rd Edition, Tata McGraw-Hill, New Delhi, 2002. 3. Jacob Millman, Christos C.Halkias, Satyabrata Jit, "Electronics Devices and Circuits", 3rd Edition, Tata McGraw Hill, 2008. 4. Morris Mano, "Digital Computer Design", PHI, 2003.
Mode of Evaluation	Written Examinations, Quizzes, Assignments, Lab Exam and Viva-voce.
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

CSE101	Computer Programming and Problem Solving	L T P C 2 0 2 3
Version No.	1.0	
Course Prerequisites	-	
Objectives	To provide an overview of computers and problemsolving methods using 'C' Language to serve as a foundation for the study of programming languages.	
Expected Outcome	The student would acquire various problem solving techniques andwill be able to implement them in 'C' language.	
Module I	Introduction to Computers and Algorithms	
Parts of a computer – Overview of operating systems, assembler, compilers, interpreters and programming languages. Algorithms for exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generationof the Fibonaccisequence, reversing the digits of an integer, flowchart.		
Module II	Constructs of C	
Lexical elements – Operators - data types – I/O statements – format specifications – control statements – decision making and Loop control structure: while loop, for loop, do-while loop, nested loop,break, continue, case control structure, goto, exit statement		
Module III	Arrays	
Array handling in C – declaration – single dimensional arrays, two – dimensional arrays, multi-dimensional arrays, sorting and searching on single and two dimensional arrays. Array order reversal, string handling function, manipulation on strings.		
Module IV	Functions	
Prototype – declaration - arguments (formal and actual) – return types – types of functions difference between built-in and user-defined functions.		
Module V	Structures	

Pointers
Declarations, types of pointers, use of pointers with array, structure and union.

File handling
Use of file, access of file in C, difference between file handling and data base.

Text Books	1. Alexis Leon and Mathews Leon (2001), Introduction to
	Information Technology, Tata McGraw-Hill. 2. R.G. Dromey (2001), How to Solve it by Computer,Prentice Hall ofIndia. 3. Al Kelley and Ira Pohl (1998), A Book on C Programmingin C, 4th Edition, Pearson Education.
Reference Books	1. E.Balagurusamy (2008), Computing Fundamentals And C Programming, Tata McGraw-Hill 2. Brian W. Kernighan and Dennis M. Ritchie, The C programmi Language, Prentice-Hall in 1988 3. Byron Gottfried, Programming with C, Schaum's Outline
Mode Evaluation	Written Examinations, Quizzes, Assignments,
Recommendation by Board of Studies on	
Date of approval by the Academic Council	

GER101	Foreign Language (German)	L	T	P	C
		2	0	0	2

Version No.	1.0
Prerequisite	-
Objectives:	The course aims at basic written and oral skills (comprehension and expression) in German which will enable the students to have higher education and job opportModuleies in India and abroad. As a whole, it will bring an idea about the German culture and soci**e**ty
Expected Outcome:	The learners will get the required training in the above mentioned language skills which will enable them to practice it in day to day life,in higher education and in career too
Module I	Lektion I

Personalpronomen, Konjugation von Verben: heiβen, lernen, kommen,arbeiten, wohnen,machen.

Module II	Lektion II

Possessivpronomen, Verb- Sein, Singular, Plural, Wortbildung, Ja/ Nein Frage undFragewoerter, Tempus-Praesens, Dialoge, Imperativ.

Module III	Lektion III

Bestimmter und Unbestimmter Artikel, Verb- Haben, Negation- Nicht, Kein, Zahlen, Partikeln, Maskulin, Feminin und Neutrum. Kasus – Nominativ und Akkusativ, Dialoge

Module IV	Lektion IV

Die Zeit, Starke Verben, Praepositionen Fragewoerter (Zeitangabe), Das Essen und Leben in Deutschland, Landkarte und Geschichte von Deutschland

Module V	Lektion V

Trennbare Verben, Modal Verben, Dialoge mit Kontext: Bahnhof, Universitaet, Flughafenusw, Technische Woerter

Text Books	

Hieber Wolfgang, Lernziel Deutsch.München: 2005

Reference Books	

1. Gick, Cornelia, Momentmal, Grundstufenlehrwerk Deutsch als Fremdsprache.M: 2003
2. Maria Dallapiazza, Eduard von Jan, Til Schonherr.Tangram, Deutsch als Fremdsprache.Berlin: 2005
3. Griesbach, Schulz. Deutsche Sprachlehre für Ausländer. München: 2005

Mode of Evaluation	Written Examinations, Quizzes, Assignments,

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

FRE101	Foreign Language (French)	L	T	P	C
		2	0	0	2

Version No.	1.0

Prerequisite	-

Objectives:	The course aims at basic written and oral skills (comprehension and expression) in French which will enable the students to have higher education and job opportModuleies abroad.

Expected Outcome:	The learners will get the required training in the above mentioned language skills and they will also have the additional advantage of communicating in French which is the second most commonly used language worldwide

Module I	Rencontres

Saluer, se présenter, demander, remercier**,** le genre des noms, les pronoms sujet et tonique,l'article défini et indéfini.

Module II	Radio Belleville, j'adore !

Parler de ses gouts et de ses loisirs, poser des questions, décrire quelqu'un, les verbes auprésent, la négation du verbe, le pluriel des noms, les adjectives.

Module III	C'est ma carte

Demander/donner des informations sur une personne, parler de soi, de sa famille, comprendre et écrire un mail, l'adjectif possessif, le verbe « aller », l'article contracte, c'est/ce sont.

Module IV	Une radio, mais pourquoi ?

Nommer/situer un objet, exprimer la surprise, demander de faire quelque chose, exprimer une obligation, l'adjectif interrogatif, les prepositions de lieu, la negation de l'article indefini, il faut…, pouvoir, vouloir.

Module V	En direct de Radio Belleville

Demander/dire l'heure, demander pourquoi et répondre, l'interrogation, faire, connaitre, l'accord des adjectifs en genre et en nombre, le pronom "on"	
Text Books	
Belleville 1, Méthode de français, Flore Cuny, Anne-Marie Johnson, CLE International,2004	
Reference Books	
1. La France de toujours, Nelly Mauchamp; CLE international 2. Déclic 1; Jacques Blanc, Jean-Michel Cartier, Pierre Lederlion; CLE International 3. Champion 1 ; Annie Monnerie – Goarin, Evelyne Sirejols; CLE International 4. Campus 1; Jacky Girardet, Jacques Pecheur; CLE International	
Mode of Evaluation	Written Examinations, Quizzes, Assignments,
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

JAP101	Foreign Language (Japanese)	L	T	P	C
		2	0	0	2

Version No.	1.0
Prerequisite	-
Objectives:	The course aims at the development of the basic skills for reading,writing and communicating inJapanese . 2. This will enhance to have a good job and higher education abroad
Expected Outcome:	At the end of the semester the students will be able to communicate inJapanese language. 2. They will be able to survive in a Japanese speaking country and meettheir daily needs.
Module I	

1. Introduction to Japanese Alphabets
2. Vowels and Consonants
3. Hiragana, Katakana
4. Pronunciation
5. Writing practice
6. Japanese Numerals
7. Demonstrative pronoun

Kore, Sore, Are and Dore (This, That, Over there, which) Kono, sono, Ano and Dono (this, that, over there, which) Kochira, Sochira, Achira and Dochiora (this way.) Koko, Soko, Asoko and Doko (Here, There….location)

8. Greetings
9. Classification of verbs (be verb desu (Present tense)
10. Part of body (look and learn)
11. Particle -Wa

| **Module II** | |

1. Basic structure of sentence (Subject+ Object+ Verb)
2. Classification of verbs
    a) Be verb desu Present and Present negative Past and Past negative
    b) Aru and Iru for living things and non living things
    c) Masu form (Present and Present negative)
3. Particle- Ka, Ni, Ga,
4. Conjunction-Ya
5. Grammar- ~ Go, ~Jin, San
6. Days/ Months /Year/Week (Current, Previous, Next, Next to Next)
7. Nation, People and Language
8. Classification of Adjectives I and Na
9. Vocabulary and its Meaning
10. Audio tape listening
11. Class tests

Module III	

1. Classification of Particle
   Ga, Ka, Wa, O, E, Ni, De, No, Kara, Made)
2. Classification of Adjectives I and Na
3. Classification of verbs
   Go dan verb, Ichdan vers and Irregular verbs
   (Present, Present negative and past negative)
1. Classification of question words(
   Doko, Dore, Dono, Dochira)
2. Time expressions (Jikan)
3. Number of hours
4. Vocabulary and its Meaning
5. Number of months, calendar of a month
6. Audio tape listening
10. Class tests

HUM201	**Psychology & Sociology**	L	T	P	C
		3	0	0	3

Version No.	1.0

Prerequisite	-

Objectives:	1. To teach students how to describe human behavior using appropriate concepts 2. To enable the students understand the contributions made by eminent thinkers and researchers to the pool of knowledge in the field 3. To make students realize the relevance of Sociology and Psychology in the context of the present day organizations

Expected Outcome:	Student will be able to 1. To become aware of the causes and consequences of Social and Psychological problems 2. To be able to understand the impact of social environment on individuals and groups 3. To be able to utilize the knowledge of Sociology and Psychology to improve 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 of religion

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	

1. Grace Davie: Sociology of Religion, Sage Publications 2007
2. Sharmila Rege: Sociology of Gender, Sage Publications 2003
3.Meena Hariharan and Radhanath Rath: Coping With Life Stress, Sage Publications2008
4. 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:	

EVS-102	Environmental Science & Energy
	L T P C 3 0 0 3
Version No.	1.0
Objectives	1. Making the students understand and appreciate the Moduley of life in all its forms, the implications of life style on the environment. 2. To give students a basic understanding of the major causes of environmental degradation on the planet, with specific reference to theIndian situation. 3. To inspire students to find ways in which they can contribute personally and professionally to preventing and rectifying environmental problems.
Expected Outcome	1. Students will understand the need for ecobalance 2. Knowledge on the method of pollution prevention would be acquired
Module I	Environment & Natural Resources

Definition, scope, importance, need for public, 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, food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, land slides, soil erosion, desertification & case studies

| Module II | Ecology & Bio-diversity |

Concept of ecosystem, structure & function of an ecosystem, producers, consumers and decomposers, energy flow, ecological succession, food chains, food webs and ecological pyramids.
Bio diversity: Definition, genetic, species and ecosystem diversity, bio-geographical classification of India, hotspots, threats related to habitat loss, poaching of wildlife, man-wildlife conflicts, Conservation of bio-diversity.

| Module III | Environmental Pollution |

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.

Module IV	Social Issues and the Environment

Urban problems related to energy & sustainable development, water conservation, rain water harvesting, watershed management, problems related to rehabilitation – case studies, Wasteland reclamation, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness.

Module V	Human Population and the Environment

Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/ AIDS, Women and Child Welfare, Role of Information Technology – Visit to local polluted site / Case Studies.
Customer Orientation - QFD – CSM – TQM Models – Case Studies.

Text Books	1. Kurian Joseph & R. Nagendran, "Essentials of Environmental Studies", 1st Edition, Pearson Education, 2004.
Reference Books	1. Keerthinarayana & Daniel Yesudian, "Environmental Science and Engineering", 1st Edition, Hi-Tech publications, 2004. 2. Erach Bharucha, "A Text Book for Environmental Studies", Text Book ofUniversity Grants Commission, 2004. 3. Peavy, H.S., D.R. Rowe & T.George, "Environmental Engineering", NewYork: Mc Graw Hill, 1987. 4. Metcalf & Eddy,"Wastewater Engineering: Treatment and Reuse", New Delhi, Tata McGraw Hill, 2003.
Mode of Evaluation	Written Examination, Assignment, Quizzes.

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

Name of The Course	UNIVERSAL HUMAN VALUES AND ETHICS
Course Code	LLL101
Prerequisite	
Co-requisite	
Anti-requisite	

		L	T	P	C
		0	0	2	1

Course Objectives

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want
   to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. 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 intheir 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 lifeand 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 strategyto actualize a harmonious environment wherever they work.

Text Book (s)

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

Reference Book (s)

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E. F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. 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

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario.
6. 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

1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
2. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of 'I' and harmony in 'I'
5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
6. Programs to ensure Sanyam and Swasthya

Module III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

1. Understanding harmony in the Family- the basic unit of human interaction
2. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
3. Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
4. Understanding the meaning of *Vishwas*; Difference between intention and competence
5. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
6. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals

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7. 7. Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family!

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8. Module IV: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

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9. Understanding the harmony in the Nature
10. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self- regulation in nature
11. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
12. Holistic perception of harmony at all levels of existence

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13. Module V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

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14. Natural acceptance of human values
15. Definitiveness of Ethical Human Conduct
16. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
17. Competence in Professional Ethics:
18. Ability to utilize the professional competence for augmenting universal human order
19. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models
20. Case studies of typical holistic technologies, management models and production systems
21. Strategy for transition from the present state to Universal Human Order:
22. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
23. At the level of society: as mutually enriching institutions and organizations

MEE151	Engineering Graphics	L	T	P	C
		0	0	4	2

Version No.	1.0	
Prerequisite	-	
Objectives:	1. To create awareness and emphasize the need for Engineering Graphicsin all the branches of engineering. 2. To follow basic drawing standards and conventions. 3. To develop skills in three-dimensional visualization of engineeringcomponent.	
Expected Outcome:	On completion of this course, the students will be able to 1. Prepare drawings as per standards (BIS). 2. Solve specific geometrical problems in plane geometry involvinglines, plane figures and special Curves. 3. Produce orthographic projection of engineering components workingfrom pictorial drawings.	
Module I	Introduction	
Introduction to Engineering Graphics – Geometrical Construction – Conics and Special Curves.		
Module II	Lettering, Numerals and Dimensioning	
Single stroke letters – Dimensioning Principles.		
Module III	Orthographic Projection – Points and Lines	
Orthographic Projection – Projection of Points and lines.		
Module IV	Orthographic Projection –Planes	
Orthographic Projection – Projection of Planes in simple position, Axis Inclined to one plane.		
Module V	Orthographic Projection – Solids	
Orthographic Projection – Projection of solids in simple position, Axis Inclined to one plane.		
Text Books		
1. Venugopal K and Prabhu Raja V, "Engineering Graphics", New AGE International Publishers, 2007. 2. Manual prepared by staff		
References		

1. Bhatt N. D., "Engineering Drawing", Charotar publishing House, 1998.
2. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002.
3. Natarajan, K. V., "Engineering Graphics", Dhanalakshmi Publishers, 2006.

Mode of Evaluation	Tutorials / Class Tests / Lab Exam
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

MEE152	Workshop Practice	L 0	T 0	P 2	C 1
Version No.	1.0				
Prerequisite	-				
Objectives:	1. To train the students in metal joining process like welding, soldering, etc.				

	2. To impart skill in fabricating simple components using sheet metal. 3. To cultivate safety aspects in handling of tools and equipment.	
Expected Outcome:	On completion of this course, the students will be able to 1. Welding and soldering operations. 2. Fabrication of simple sheet metal parts.	
Module I	Welding Shop	

1. Instruction of BI standards and reading of welding drawings.
2. T- Joint
3. Lap Joint
4. TIG Welding
5. MIG Welding

Module II	Sheet Metal Shop	

1. Making of Cylinder
2. Making of Cylinder using development of surface.
3. Making of Square box using development of surface.

Module III	Soldering Shop	

1. Soldering and desoldering of Resistor in PCB.
2. Soldering and desoldering of IC in PCB.
3. Soldering and desoldering of Capacitor in PCB.

Module IV	Bosch Tools	

Demonstration of all BOSCH TOOLS

Text Books	

Workshop Manual prepared by staff

Mode of Evaluation	Tutorials / Class Tests / Lab Exam

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:	
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

PHY151	Physics Lab – I	0	0	2	1

Version No.	1.0
Prerequisite	-
Objectives:	The objective of teaching the engineering physics Lab to engineering student to make the students aware about the practical science in physics.
Expected Outcome:	-
Experiment No.	Name of the Experiment

1. To determine the wavelength of monochromatic light with the help of Fresnel;s bi-prism method.
2. To determine the wavelength of He-Ne laser light by diffraction method at a single slit.
3. To study the polarization of light by simple reflection using He-Ne laser
4. To study the variation of magnetic field with distance along the axis of current carryingcoil and then to estimate the radius of coil.
5. To very the Stefan's law by electrical method.
6. To calibrate the ammeter and voltmeter with the help of potentiometer.
7. To measure the attenuation along an optical fiber by chuk back method.
8. To determine the resolving power of telescope.
9. To measure the numerical aperture of an optical fiber.
10. Find the angle of a prism and calculate Chauchi's constant.
11. To determine the velocity of ultrasonic wave in liquid.
12. To find the frequency of A.C. mains using sonometer.

Mode of Evaluation	Laboratory examinations, viva-voce

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

EEE 151		Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
Version No.	1.0					
Prerequisite	-					
Experiment No.		Name of the Experiment				

1. Verification of Kirchhoff's law.
2. Verification of Thevenin's, Nortran and maximum power transfer theorems.
3. Steady state analysis of RLC series/parallel circuits and Resonance.
4. Measurement of 3 phase power using 2 wattmeter method.
5. Study of internal parts of DC machine and 3 phase induction motor using cut models.
6. Determination of circuit parameters of single phase transformer.
7. Forward and reverse characteristics of PN junction diode and Zener diode.
8. BJT Characteristics
9. JFET Characteristics
10. Truth table verifications: AND, OR, NAND, NOR, XOR and NOT.
11. Design of half and full adder circuits
12. Study of Clipper and Clamper Circuits.

Mode of Evaluation	Laboratory examinations, viva-voce
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

Computer Programming and Problem-Solving Lab	
Name of The Course	Computer Programming and Problem-Solving Lab
Course Code	CSE151
Prerequisite	NA
Corequisite	NA
Anti-requisite	NA

	L	T	P	C
	1	0	4	3

Course Objectives:

- Provide an overview of computers and problem-solving methods using 'C' language

- Serve as a foundation for the study of programming languages.

- Learn to develop program using 'C' language.

- To develop the software using the concept of 'C' Language.

Course Outcomes:	
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 logic using the concept of arrays and to understand the modular techniques such as functions.
CO4	Implement and develop small projects using the concept Structures and to understand and implement Pointers in C programming language.
CO5	Understand and apply basic file handling and string Operations
CO6	Understanding of latest advances and its applications in Computer Programming and Problem Solving.

Text Book (s)

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

- R.G. Dromey (2001), How to Solve it by Computer, Prentice Hall of India.

- Al Kelley and Ira Pohl (1998), A Book on C Programming in C, 4th Edition, Pearson Education.

Reference Book (s)

- E. Balagurusamy7th Edition, Programming ANSI C, McGraw-Hill

- Brian W. Kernighan and Dennis M. Ritchie, The C programming Language, Prentice-Hall in 1988

- Byron Gottfried, Programming with C, Schaum's Outline

Course Content:

1. Write a program to display "hello world" in C.
2. Write a program to add two numbers (5&7) and display its sum.
3. Write a program to multiply two numbers (10&8) and display its product.
4. Write a program to calculate area of a circle having its radius (r=5).
5. Write a program to calculate area of an ellipse having its axes (minor=4cm, major=6cm).
6. Write a program to calculate simple interest for a given P=4000, T=2, R=5.5. (I = P*T*R/100)
7. Write a program to declare two integer and one float variables then initialize them to 10, 15, and 12.6. Also print the variable values in the screen.

8. Write a C program to prompt the user to input 3 integer values and print these values in forward and reversed order.

9. Write a program to calculate simple and compound interest.

10. Write a program to swap two variables values with and without using third variables

11. Write a program to check odd or even number (a) using modulus operator (b) using bitwise operator (c) without using bitwise and modulus operator (d) using conditional operator.

12. Print the value of y for given x=2 & z=4 and analyze the output.

    a. y = x+++ ++x;   b. y= ++x + ++x;   c. y= ++x + ++x +++x;

    d. y = x>z;   e.   y=x>z? x:z;   f. y = x&z; g. y= x>>2 + z<<1;

13. Write a program to print the size of char, float, double and long double data types in C.

14. Write a program to produce the output as shown below:

x		y		expressions		results
6	|	3	|	x=y+3	|	x=6
6	|	3	|	x=y-2	|	x=1
6	|	3	|	x=y*5	|	x=15
6	|	3	|	x=x/y	|	x=2
6	|	3	|	x=x%y		x=0

14. Given the three numbers a(=8), b(=4),c and constant value PI=3.1415, calculate and display the following result using macros (preprocessor directives)

a. c = PI * mult(a,b) //the macro mult(a,b) perform the multiplication of a & b(a*b)

b. c= PI* sum(a,b)   //the macro mult(a,b) perform the sum of a & b (a+b)

c. c= PI *sub(a,b)   //the macro mult(a,b) perform the subtraction of a & b (a-b)

d. c= PI*div(a,b) //the macro mult(a,b) perform the division of a & b (a/b)

15. Demonstrate the differences among getch(), getche(), getchar(). Demonstrate the difference between scanf() & gets(), printf() & puts().

16. Write a program to take a character input from keyboard and check if it is a number or alphabet or special character using ASCII CODE Again check if the character is using character functions below:

a. Alphanumeric => isalnum()

b. Blank character => isblank()

c. Alphabetic => isalpha()

d. Control character => iscntrl()

e. Number-digit => isdigit()

f. Upper case => isupper()

g. Lower case => islower()

h. Hexadecimal digit => ixdigit()

i. Graphical character => isgraph()

17. Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd.

18. Write a program to check whether input alphabet is vowel or not using if-else and switch statement.

19. Write a program to get input of two or higher digit integer number and display in reverse order.

20. Write a program that asks a number and test the number whether it is multiple of 5 or not, divisible by 7 but not by eleven.

21. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)

22. Write a program to input two integer numbers and display the sum of even numbers between these two input numbers.

23. Write a program to find GCD (greates common divisor or HCF) and LCM (least common multiple) of two numbers.

24. Write a program to display Fibonacci series of last term up to 300.

25. Write a program to display the flag of Nepal using symbolic/HEX character in C.
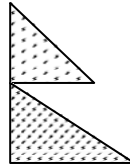
26. Write a program to display the following.

a.

```
 *   *              *   *
  *        *       *
 *        *       *
      *   *
```

b.

```
1
1    4
1    4    9
1    4    9    16
1    4    9    16    25
```

c.

```
*
*      *
*      *
*      *
```

d.

```
1    6    10    13    15
2    7    11    14
3    8    12
4    9
5
```

LLL 121	**ENGLISH PROFICIENCY**	L	T	P	C
Version 1.01	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of Semester 1				
Duration	12 sessions of 100 minutes each				

Course Objectives

1. To enable the students to improve English Language Communication skills
2. To enable the students to continue to learn and use English regularly and confidently
3. To enable the students to enhance data analysis techniques

Course Outcomes

At the end of this course, the learner will be:
1. Develop effective communication (listening and speaking) skills - be able to listen carefully and respectfully other's perspective and to express one's own ideas in a group.
2. Construct grammatically correct sentences and practicing correct pronunciation of common words in English language for effective communication.
3. Develop real-time problem solving skills in quantitative aptitude.
4. Develop basic data analyzing techniques which will help in forecasting and decision making.

Course Catalogue

The course takes the English communication to the next level, focusing on listening, speaking, reading and writing skills wherein the students utilize their language skills in the various modes of communication, each mode having equal importance.

Text Book

SLLL own text book

Reference Books
1. English Vocabulary in Use (Advanced), Michael McCarthy and Felicity, CUP, 2003
2. Murphy's English Grammar with C.D. Murphy, Cambridge University Press.
3. Quicker Maths , M Tyra
4. Quantitative Aptitude, Abhijeet Guha

Course Content

Unit I: Introduction & Communication Skills   **4 lectures**
- Ice Breaking Activity
- Speaking Activity
- Pronunciation
- Listening Skills

Unit II: Grammar   **2 lectures**
- Pronouns
- Articles and Prepositions

Unit III: Quantitative Aptitude   **6 lectures**
- Number System
- Percentage
- Profit and Loss

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

	Theory	
Components	**Internal**	**SEE**
Marks	50	50
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes (POs)**
1	Develop effective communication (listening and speaking) skills - be able to listen carefully and respectfully other's perspective and to express one's own ideas in a group.	10
2	Construct grammatically correct sentences and practicing correct pronunciation of common words in English language for effective communication.	12
3	Develop real-time problem solving skills in quantitative aptitude.	12
4	Develop basic data analyzing techniques which will help in forecasting and decision making.	12

	SLBT 1002 English Proficiency and Aptitude Building 1		
		1	Engineering Knowledge
		2	Problem analysis
		3	Design/development of solutions
		4	Conduct investigations of complex problems
		5	Modern tool usage
		6	The engineer and society
		7	Environment and sustainability
		8	Ethics
		9	Individual or team work
	2	10	Communication
		11	Project management and finance
	2	12	Life-long Learning

1=addressed to small extent

2= addressed significantly

MAT-121   Ordinary Differential Equations and Integral Transforms   L T P *C* : 3 1 0 4

Objective: *The aim of this course is to give an exposure to Ordinary Differential equations as well as different types of Integral Transforms to first year students. The utility of Laplace transform in solving differential equations is emphasized. Fourier Series and Fourier Transforms are also introduced. The concepts related to these tools are useful in mathematical modeling of a system encountered in their further course of study. Some elementary applications of differential equations in simple electrical circuits are considered that lays the foundation of modeling aspects through differential equations. Various existing techniques of finding solutions are discussed which teaches the students in using them in situations of interests in engineering.*

Prerequisite: MAT-111

Module-I   **Contact Hours: 16**

Ordinary Differential Equations: Exact differential equations, Equations reducible to exact differential equations, linear differential equations of second and higher order with constant coefficient, complementary function and particular integral, Complete solution, Method of variation of parameters, Cauchy's and Legendre's linear equations, System of linear differential equations with constant coefficients, Singular points, Power series solution by the method of Frobenius and it's application in solving Bessel's and Legendre's equations, Applications of linear differential equations.

Module-II   **Contact Hours: 12**

Laplace Transform: Definition and Existence of Laplace Transform, Properties of Laplace transforms, LT of Unit step function and Dirac Delta Functions, Transforms of derivatives and integrals, multiplication and division by t, Evaluation of integrals by Laplace transforms, Convolution theorem, Inverse Laplace transforms, Application of Laplace Transform.

Module-III   **Contact Hours: 6**

Fourier series: Euler's formulae, Dirichlet's condition for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series,

Module-IV   **Contact Hours: 6**

Fourier Transforms : Fourier integrals, Complex Fourier transforms, Fourier sine and cosine transform, Shifting theorem, Fourier transforms of derivatives, Convolution theorem.

Text Books:

1. **Advanced Engineering Mathematics**   :   *R. K. Jain and S. R. K. Iyengar,* Narosa Publishers*.*

2. Advanced Engineering Mathematics   :   *Peter V. O'Neil* , Pearson Education, Asia.

Reference Books:

1. Advanced Engineering Mathematics   :   *Michael D. Greenberg*, Pearson Education, Asia

2. Advanced Engineering Mathematics   :   *E. Kreyszig*, John Wiley & Sons.

EEE101	Basic Electrical and Electronics Engineering	L	T	P	C
		3	0	2	4
Version No.	1.0				
Prerequisite	Physics at +2 or equivalent level				
Objectives:					
Expected Outcome:					
Module I	Elementary Circuit Analysis				
Ohm's law, KCL, KVL, node voltage analysis, mesh current, circuits with independent sources, Thevenin's & Norton's equivalent, maximum power transfer and superposition theorem.					
Module II	Analysis of DC and AC Circuits				
Steady state DC analysis, RL and RC transients in circuits with DC source, RMS values, the useof phasors for constant frequency sinusoidal sources, steady state AC analysis of a series circuit, series and parallel combinations of complex impedances, AC power calculations.					
Module III	Digital Systems				
Basic logic circuit concepts, Basic Gates and Universal Gates, representation of numerical data in binary form – Binary to decimal, Octal, Hexadecimal, Boolean algebra, combinational logic circuits- Half adder, full adder, synthesis of logic circuits, minimization of logic circuits - sequential logic circuits - computer organization, memory types, analog to digital conversion.					
Module IV	Semiconductor Devices				
Basic diode concepts, ideal diode model, rectifier and wave-shaping circuits, zener diode voltage regulator concepts, bipolar junction transistors, current and voltage relationship, common emitter characteristics, basic amplifier concepts, cascaded amplifiers, ideal amplifiers, differential amplifiers, JFET, CMOS- NMOS and PMOS transistors, ideal operational amplifiers, inverting and non-inverting amplifiers, integrators & differentiators.					
Module V	Electro-mechanics				
Ideal and real transformers, principles of rotating DC machines, shunt, separately excited and series connected DC motors, speed control of DC motors, Three phase induction motors, synchronous machines and single phase induction motors.					
Text Books					

3. D.P. Kothari and I.J. Nagrath , "Basic Electrical Engineering", 2nd Edition, TataMcGraw-Hill, 2002.
4. V.Mittle, Arvind Mittle, "Basic Electrical Engineering", McGraw Hill, 2005.

	5. Robert L.Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 9thEdition, Pearson Education, 2007. 6. A.P.Malvino, Donald Leach, "Digital Principles and Applications", 6th Edition, TataMcGraw Hill, 2006.
Reference Books	
	5. D.C.Kulshreshtha,"Basic Electrical Engineering", Tata McGraw Hill, 2009. 6. J. Edminister and M. Nahvi , "Electric Circuits", 3rd Edition, Tata McGraw-Hill, New Delhi, 2002. 7. Jacob Millman, Christos C.Halkias, Satyabrata Jit, "Electronics Devices and Circuits", 3rd Edition, Tata McGraw Hill, 2008. 8. Morris Mano, "Digital Computer Design", PHI, 2003.
Mode of Evaluation	Written Examinations, Quizzes, Assignments, Lab Exam and Viva-voce.
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

5. Robert L.Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education, 2007.
6. A.P.Malvino, Donald Leach, "Digital Principles and Applications", 6th Edition, TataMcGraw Hill, 2006.

5. D.C.Kulshreshtha,"Basic Electrical Engineering", Tata McGraw Hill, 2009.
6. J. Edminister and M. Nahvi , "Electric Circuits", 3rd Edition, Tata McGraw-Hill, New Delhi, 2002.
7. Jacob Millman, Christos C.Halkias, Satyabrata Jit, "Electronics Devices and Circuits", 3rd Edition, Tata McGraw Hill, 2008.
8. Morris Mano, "Digital Computer Design", PHI, 2003.

CSE101	Computer Programming and Problem Solving	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	-	
Objectives	To provide an overview of computers and problemsolving methods using 'C' Language to serve as a foundation for the study of programming languages.	
Expected Outcome	The student would acquire various problem solving techniques and will be able to implement them in 'C' language.	
Module I	Introduction to Computers and Algorithms	

Parts of a computer – Overview of operating systems, assembler, compilers, interpreters and programming languages. Algorithms for exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generationof the Fibonacci sequence, reversing the digits of an integer, flowchart.

Module II	Constructs of C	

Lexical elements – Operators - data types – I/O statements – format specifications – control statements – decision making and Loop control structure: while loop, for loop, do-while loop,nested loop, break, continue, case control structure, goto, exit statement

Module III	Arrays	

Array handling in C – declaration – single dimensional arrays, two – dimensional arrays, multi-dimensional arrays, sorting and searching on single and two dimensional arrays. Array order reversal, string handling function, manipulation on strings.

Module IV	Functions	

Prototype – declaration - arguments (formal and actual) – return types – types of functions difference between built-in and user-defined functions.

Module V	Structures	

Pointers
Declarations, types of pointers, use of pointers with array, structure and union.

File handling
Use of file, access of file in C, difference between file handling and data base.

Text Books	1. Alexis Leon and Mathews Leon (2001), Introduction to

	Information Technology, Tata McGraw-Hill.
	4. R.G. Dromey (2001), How to Solve it by Computer, Prentice Hall ofIndia.
	5. Al Kelley and Ira Pohl (1998), A Book on C Programming in C, 4th Edition, Pearson Education.
Reference Books	4. E.Balagurusamy (2008), Computing Fundamentals And C Programming, Tata McGraw-Hill
	5. Brian W. Kernighan and Dennis M. Ritchie, The C programmi Language, Prentice-Hall in 1988
	6. Byron Gottfried, Programming with C, Schaum's Outline
Mode of Evaluation	Written Examinations, Quizzes, Assignments,
Recommendation by Board of Studies on	
Date of approval by the Academic Council	

GER101	Foreign Language (German)	L	T	P	C
		2	0	0	2

Version No.	1.0
Prerequisite	-
Objectives:	The course aims at basic written and oral skills (comprehension and expression) in German which will enable the students to have higher education and job opportModuleies in India and abroad. As a whole, it will bring an idea about the German culture and soci**e**ty
Expected Outcome:	The learners will get the required training in the above mentioned language skills which will enable them to practice it in day to day life,in higher education and in career too
Module I	Lektion I

Personalpronomen, Konjugation von Verben: heiβen, lernen, kommen,arbeiten, wohnen,machen.

Module II	Lektion II

Possessivpronomen, Verb- Sein, Singular, Plural, Wortbildung, Ja/ Nein Frage undFragewoerter, Tempus-Praesens, Dialoge, Imperativ.

Module III	Lektion III

Bestimmter und Unbestimmter Artikel, Verb- Haben, Negation- Nicht, Kein, Zahlen, Partikeln, Maskulin, Feminin und Neutrum. Kasus – Nominativ und Akkusativ, Dialoge

Module IV	Lektion IV

Die Zeit, Starke Verben, Praepositionen Fragewoerter (Zeitangabe), Das Essen und Leben in Deutschland, Landkarte und Geschichte von Deutschland

Module V	Lektion V

Trennbare Verben, Modal Verben, Dialoge mit Kontext: Bahnhof, Universitaet, Flughafenusw, Technische Woerter

Text Books	

Hieber Wolfgang, Lernziel Deutsch.München: 2005

Reference Books	

4. Gick, Cornelia, Momentmal, Grundstufenlehrwerk Deutsch als Fremdsprache.M: 2003
5. Maria Dallapiazza, Eduard von Jan, Til Schonherr.Tangram, Deutsch als Fremdsprache.Berlin: 2005
6. Griesbach, Schulz. Deutsche Sprachlehre für Ausländer. München: 2005

Mode of Evaluation	Written Examinations, Quizzes, Assignments,

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

FRE101	Foreign Language (French)	L	T	P	C
		2	0	0	2

Version No.	1.0

Prerequisite	-

Objectives:	The course aims at basic written and oral skills (comprehension and expression) in French which will enable the students to have higher education and job opportModuleies abroad.

Expected Outcome:	The learners will get the required training in the above mentioned language skills and they will also have the additional advantage of communicating in French which is the second most commonly used language worldwide

Module I	Rencontres

Saluer, se présenter, demander, remercier**,** le genre des noms, les pronoms sujet et tonique, l'article défini et indéfini.

Module II	Radio Belleville, j'adore !

Parler de ses gouts et de ses loisirs, poser des questions, décrire quelqu'un, les verbes auprésent, la négation du verbe, le pluriel des noms, les adjectives.

Module III	C'est ma carte

Demander/donner des informations sur une personne, parler de soi, de sa famille, comprendre et écrire un mail, l'adjectif possessif, le verbe « aller », l'article contracte, c'est/ce sont.

Module IV	Une radio, mais pourquoi ?

Nommer/situer un objet, exprimer la surprise, demander de faire quelque chose, exprimer une obligation, l'adjectif interrogatif, les prepositions de lieu, la negation de l'article indefini, il faut…, pouvoir, vouloir.

Module V	En direct de Radio Belleville

Demander/dire l'heure, demander pourquoi et répondre, l'interrogation, faire, connaitre, l'accord des adjectifs en genre et en nombre, le pronom "on"	
Text Books	
Belleville 1, Méthode de français, Flore Cuny, Anne-Marie Johnson, CLE International,2004	
Reference Books	
5. La France de toujours, Nelly Mauchamp; CLE international 6. Déclic 1; Jacques Blanc, Jean-Michel Cartier, Pierre Lederlion; CLE International 7. Champion 1 ; Annie Monnerie – Goarin, Evelyne Sirejols; CLE International 8. Campus 1; Jacky Girardet, Jacques Pecheur; CLE International	
Mode of Evaluation	Written Examinations, Quizzes, Assignments,
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

JAP101	Foreign Language (Japanese)	L	T	P	C
		2	0	0	2

Version No.	1.0
Prerequisite	-
Objectives:	The course aims at the development of the basic skills for reading,writing and communicating inJapanese . 2. This will enhance to have a good job and higher education abroad
Expected Outcome:	At the end of the semester the students will be able to communicate inJapanese language. 2. They will be able to survive in a Japanese speaking country and meettheir daily needs.
Module I	

12. Introduction to Japanese Alphabets
13. Vowels and Consonants
14. Hiragana, Katakana
15. Pronunciation
16. Writing practice
17. Japanese Numerals
18. Demonstrative pronoun

Kore, Sore, Are and Dore (This, That, Over there, which) Kono, sono, Ano and Dono (this, that, over there, which) Kochira, Sochira, Achira and Dochiora (this way.) Koko, Soko, Asoko and Doko (Here, There….location)

19. Greetings
20. Classification of verbs (be verb desu (Present tense)
21. Part of body (look and learn)
22. Particle -Wa

Module II	

12. Basic structure of sentence (Subject+ Object+ Verb)
13. Classification of verbs
   a) Be verb desu Present and Present negative Past and Past negative
   b) Aru and Iru for living things and non living things
   c) Masu form (Present and Present negative)
14. Particle- Ka, Ni, Ga,
15. Conjunction-Ya
16. Grammar- ~ Go, ~Jin, San
17. Days/ Months /Year/Week (Current, Previous, Next, Next to Next)
18. Nation, People and Language
19. Classification of Adjectives I and Na
20. Vocabulary and its Meaning
21. Audio tape listening
22. Class tests

Module III	

4. Classification of Particle
   Ga, Ka, Wa, O, E, Ni, De, No, Kara, Made)
5. Classification of Adjectives I and Na
6. Classification of verbs
   Go dan verb, Ichdan vers and Irregular verbs
   (Present, Present negative and past negative)
7. Classification of question words(
   Doko, Dore, Dono, Dochira)
8. Time expressions (Jikan)
9. Number of hours
10. Vocabulary and its Meaning
11. Number of months, calendar of a month
12. Audio tape listening
10. Class tests

HUM201	**Psychology & Sociology**	L	T	P	C
		3	0	0	3

Version No.	1.0

Prerequisite	-

Objectives:	4. To teach students how to describe human behavior using appropriate concepts 5. To enable the students understand the contributions made by eminent thinkers and researchers to the pool of knowledge in the field 6. To make students realize the relevance of Sociology and Psychology in the context of the present day organizations

Expected Outcome:	Student will be able to 4. To become aware of the causes and consequences of Social and Psychological problems 5. To be able to understand the impact of social environment on individuals and groups 6. To be able to utilize the knowledge of Sociology and Psychology to improve 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 of religion	

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	

5. Grace Davie: Sociology of Religion, Sage Publications 2007
6. Sharmila Rege: Sociology of Gender, Sage Publications 2003
7.Meena Hariharan and Radhanath Rath: Coping With Life Stress, Sage Publications 2008
8. 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:	

EVS-102	**Environmental Science & Energy**
	L T P C **:** 3 0 0 3
Version No.	1.0
Objectives	4. Making the students understand and appreciate the Moduley of life in all its forms, the implications of life style on the environment. 5. To give students a basic understanding of the major causes of environmental degradation on the planet, with specific reference to theIndian situation. 6. To inspire students to find ways in which they can contribute personally and professionally to preventing and rectifying environmental problems.
Expected Outcome	3. Students will understand the need for ecobalance 4. Knowledge on the method of pollution prevention would be acquired
Module I	Environment & Natural Resources

Definition, scope, importance, need for public, 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, food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on
environment, Energy resources – need to develop renewable energy, land resources – Land degradation, land slides, soil erosion, desertification & case studies

Module II	Ecology & Bio-diversity

Concept of ecosystem, structure & function of an ecosystem, producers, consumers and decomposers, energy flow, ecological succession, food chains, food webs and ecological pyramids.
Bio diversity: Definition, genetic, species and ecosystem diversity, bio-geographical
classification of India, hotspots, threats related to habitat loss, poaching of wildlife, man-wildlifeconflicts, Conservation of bio-diversity.

Module III	Environmental Pollution

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.

Module IV	Social Issues and the Environment

Urban problems related to energy & sustainable development, water conservation, rain waterharvesting, watershed management, problems related to rehabilitation – case studies, Wasteland reclamation, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness.	
Module V	Human Population and the Environment
Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/ AIDS, Women and Child Welfare, Role of Information Technology – Visit to local polluted site / Case Studies. Customer Orientation - QFD – CSM – TQM Models – Case Studies.	
Text Books	1. Kurian Joseph & R. Nagendran, "Essentials of Environmental Studies", 1st Edition, Pearson Education, 2004.
Reference Books	5. Keerthinarayana & Daniel Yesudian, "Environmental Science and Engineering", st Edition, Hi-Tech publications, 2004. 6. Erach Bharucha, "A Text Book for Environmental Studies", Text Book ofUniversity Grants Commission, 2004. 7. Peavy, H.S., D.R. Rowe & T.George, "Environmental Engineering", NewYork: Mc Graw Hill, 1987. 8. Metcalf & Eddy,"Wastewater Engineering: Treatment and Reuse", New Delhi, Tata McGraw Hill, 2003.
Mode of Evaluation	Written Examination, Assignment, Quizzes.
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

Name of The Course	UNIVERSAL HUMAN VALUES AND ETHICS
Course Code	LLL101
Prerequisite	
Co-requisite	
Anti-requisite	

		L	T	P	C
		0	0	2	

Course Objectives

6. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
7. To help students initiate a process of dialog within themselves to know what they 'really want
to be' in their life and profession
8. To help students understand the meaning of happiness and prosperity for a human being.
9. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
10. 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)

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

Reference Book (s)

13. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
14. E. F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
15. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
16. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
17. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
18. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
19. A N Tripathy, 2003, Human Values, New Age International Publishers.
20. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
21. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
22. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
23. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
24. 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

7. Understanding the need, basic guidelines, content and process for Value Education
8. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
9. Continuous Happiness and Prosperity- A look at basic Human Aspirations
10. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
11. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario.
12. 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

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Swasthya

Module III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

7. Understanding harmony in the Family- the basic unit of human interaction
8. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
9. Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
10. Understanding the meaning of *Vishwas*; Difference between intention and competence
11. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
12. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals

7. 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

5. Understanding the harmony in the Nature
6. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
7. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
8. Holistic perception of harmony at all levels of existence

Module V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

7. Natural acceptance of human values
8. Definitiveness of Ethical Human Conduct
9. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
10. Competence in Professional Ethics:
    i.   Ability to utilize the professional competence for augmenting universal human order
    ii. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models
11. Case studies of typical holistic technologies, management models and production systems
12. Strategy for transition from the present state to Universal Human Order:
    i.   At the level of individual: as socially and ecologically responsible engineers, technologists and managers
    ii. At the level of society: as mutually enriching institutions and organizations

MEE151	Engineering Graphics	L	T	P	C
		0	0	4	2

Version No.	1.0	
Prerequisite	-	
Objectives:	4. To create awareness and emphasize the need for Engineering Graphicsin all the branches of engineering. 5. To follow basic drawing standards and conventions. 6. To develop skills in three-dimensional visualization of engineeringcomponent.	
Expected Outcome:	On completion of this course, the students will be able to 4. Prepare drawings as per standards (BIS). 5. Solve specific geometrical problems in plane geometry involvinglines, plane figures and special Curves. 6. Produce orthographic projection of engineering components workingfrom pictorial drawings.	
Module I	Introduction	
Introduction to Engineering Graphics – Geometrical Construction – Conics and SpecialCurves.		
Module II	Lettering, Numerals and Dimensioning	
Single stroke letters – Dimensioning Principles.		
Module III	Orthographic Projection – Points and Lines	
Orthographic Projection – Projection of Points and lines.		
Module IV	Orthographic Projection –Planes	
Orthographic Projection – Projection of Planes in simple position, Axis Inclined to oneplane.		
Module V	Orthographic Projection – Solids	
Orthographic Projection – Projection of solids in simple position, Axis Inclined to oneplane.		
Text Books		
3. Venugopal K and Prabhu Raja V, "Engineering Graphics", New AGE InternationalPublishers, 2007. 4. Manual prepared by staff		
References		

4. Bhatt N. D., "Engineering Drawing", Charotar publishing House, 1998. 5. French and Vierk, "Fundamentals of Engineering Drawing", McGraw Hill, 2002. 6. Natarajan, K. V., "Engineering Graphics", Dhanalakshmi Publishers, 2006.	
Mode of Evaluation	Tutorials / Class Tests / Lab Exam
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

MEE152	Workshop Practice	L 0	T 0	P 2	C 1

Version No.	1.0
Prerequisite	-
Objectives:	1. To train the students in metal joining process like welding, soldering, etc.

	4. To impart skill in fabricating simple components using sheet metal. 5. To cultivate safety aspects in handling of tools and equipment.	
Expected Outcome:	On completion of this course, the students will be able to 3. Welding and soldering operations. 4. Fabrication of simple sheet metal parts.	
Module I	Welding Shop	

6. Instruction of BI standards and reading of welding drawings.
7. T- Joint
8. Lap Joint
9. TIG Welding
10.   MIG Welding

Module II	Sheet Metal Shop	

4. Making of Cylinder
5. Making of Cylinder using development of surface.
6. Making of Square box using development of surface.

Module III	Soldering Shop	

4. Soldering and desoldering of Resistor in PCB.
5. Soldering and desoldering of IC in PCB.
6. Soldering and desoldering of Capacitor in PCB.

Module IV	Bosch Tools	

Demonstration of all BOSCH TOOLS	
Text Books	

Workshop Manual prepared by staff	
Mode of Evaluation	Tutorials / Class Tests / Lab Exam
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

PHY 141	Physics Lab-II	0	0	2	1
Version No.	1.0				
Prerequisite	-				
Objectives:	The objective of teaching the engineering physics Lab to engineering student to make the students aware about the practical science in physics				
Expected Outcome:	-				
Experiment No.	Name of the Experiment				

1. To determined the dielectric constant of solids using LCR bridge
2. To determine the wavelength of monochromatic light using Newton's ring method.
3. To study the Hall Effect and to determine the Hall coefficient, carrier density and hallmobility of a given semiconductor material using Hall set-up.
4. To determine the energy band gap of a given pure semiconductor using four probemethod.
5. To draw the characteristics of solar cell and to estimate Fill Factor (FF), and efficiency ofsolar cell.
6. To determine the magnetic susceptibility of specimen by Quincke's method
7. To determine the specific resistance of given unknown wire using Carey Foster's bridge.
8. To draw the hysteresis curve(B-H curve) of a given sample of Ferromagnetic materialand to determine retentivity, coercivity and hysteresis loss.
9. To determine the Ballistic constant of a moving coil galvanometer using deflectionmethod.
10. To determine the high resistance by leakage method.
11. To draw the characteristics of p-n junction diode and to estimate the dynamic and staticresistance.
12. To measure the electro-chemical equivalent of copper.
13. To measure the Planck's constant using LED method

Mode of Evaluation	Laboratory examinations, viva-voce

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

CSE211	**DISCRETE STRUCTURE**	3	0	0	3
Version No.	1.0				
Prerequis ite					
Objectives:	Course Objectives: - Develop a foundation of set theory concepts and notation - Explore a variety of various mathematical structures by focusing onmathematical 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				

	6. Develop the concept of relation through various representations (digraphs, matrices, lists)	
Expected Outcome:	The student learning outcomes (SLO) for the computer science/mathematics major are the ability to: 1. Implement algorithms 2. Prove computational theorems 3. Analyze computational systems 4. Communicate technical results	
Module I	**Set Theory:**	

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.

Module II	**Algebraic Structures:**	

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.

Module III	**Partial order sets:**	

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.

Module IV	**Propositional Logic:**	

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.

Module V	**Trees :**

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

References:
1. Liu and Mohapatra, "Elements of Distcrete Mathematics", McGraw Hill
2. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to
Computer Science, McGraw-Hill
3. R.P. Grimaldi, Discrete and Combinatorial Mathematics, Addison Wesley,
4. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill,
5. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, PHI

Name of The Course	English Proficiency and Aptitude Building -2				
Course Code	LLL213				
Prerequisite					
Corequisite					
Antirequisite					
	24 sessions of 100 minutes each, 12 hours of online tests	**L**	**T**	**P**	**C**
		0	0	4	2

Course Objectives:

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

Course Outcomes

CO1	To further enhance grammar skills
CO2	To enhance the analytical, logical and quantitative skills of students.
CO3	Get overall personality enhancement

Text Book (s)

SLLL own text book

Reference Book (s):

1. Communication Skills for Engineers, Mishra,Sunita&C.Muralikrishna,,Pearson
2. CorporateSoftskills,SarveshGulati,2006.
3. Effective Communication,JohnAdair,MacmillanLtd.1997.
4. Developing Communication Skills, Krishna Mohanand Meera Bannerji, Macmillan IndiaLtd.1990

MAT 211	Partial Differential Equations and Complex Analysis	L	T	P	C
Version1.1	Date of Approval:	3	1	0	4
Pre-requisites//Exposure	MAT-111 and MAT-121				
Co-requisites					

Course Objectives

To introduce the concepts of Partial Differential Equations that are often encountered in engineering study and techniques to solve them. To understand the behaviour of complex variable function and calculus of complex variable functions. The introduction of Z - Transform and it's application in solving difference equation gives an exposure of discrete transform to the students. Each of these tools has immense practical application and lays a foundation of various courses in their future course of study.

Course Outcomes

By the end of the course the students are expected to be able to:

1. Understand concepts of Partial Differential Equations and techniques to solve them.
2. Understand the behaviour of complex variable function and importance of a special class of function, analytic functions in evaluating complex and real integrals.
3. Understand the application of Z-Transform in solving difference equation

Catalog Description

This course is an introduction to the concepts of Partial differential equations and their solution. The calculus of function of complex variable is discussed. Among the most important topics are Method of separation of variables and its applications to wave equation, one dimensional heat equation and two-dimensional heat flow, Analytic function, Cauchy-Riemann Equations, Harmonic functions with application to flow problem, Zeroes and Singularities of complex valued functions, Residues, Residue theorem and It's application in evaluation of real integrals around unit and semi circle. Z-Transform is also introduced and applied in solving difference equation

Text Books:

1. **Advanced Engineering Mathematics** : *R. K. Jain and S. R. K. Iyengar,* Narosa Publishers*.*
2. **Advanced Engineering Mathematics:** *Peter V. O'Neil* , Pearson Education, Asia.

Reference Books:

1. **Advanced Engineering Mathematics** : *Michael D. Greenberg*, Pearson Education, Asia
2. **Advanced Engineering Mathematics** : *E. Kreyszig*, John Wiley & Sons.

Course Content

Module- I   **Contact Hours: 14**

Partial Differential Equations: Introduction , Lagrange's linear partial differential equation, Nonlinear equations, Charpit's method, Classification of second order partial differential equation, Method of separation of variables and its applications to wave equation, one dimensional heat equation and two dimensional heat flow (steady state solutions only), Fourier transform method in solving Heat and Wave equations.

Module- II   **Contact Hours: 10**

Functions of Complex Variable: Definition of Exponential function, Trigonometric, Hyperbolic and Logarithmic function, Limit, Continuity, Differentiability of function, Analytic function, Cauchy-Riemann Equations in Cartesian and Polar form (with Proof), Sufficient conditions for a function to be analytic(without Proof), Harmonic functions.

Module-III   **Contact Hours: 10**

Complex Integration : Cauchy- Goursat theorem(Only statement and applications), Generalized Cauchy Integral formula (without Proof), Taylor's and Laurent's series (Without Proof), radius and circle of convergence, Zeroes and Singularities of complex valued functions, Residues, Residue theorem and it's application in evaluation of real integrals around unit and semi circle.

Module-IV   **Contact Hours: 6**

Z-transform and Application: Definition and Elementary properties of Z-transform (Unilateral, bilateral), Inverse Z–transform (using partial fraction method), Convolution theorem, Solution of difference equations using Z - transform.

Mode of Evaluation: Theory only.

Components	Theory	
	Internal	**SEE**
Marks	50	50
Total Marks	100	

CSE212	**DATA STRUCTURES AND ALGORITHM**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE101				
Objectives:	The objective of the course is to introduce the fundamentals of Data Structures, Abstract concepts and how these concepts are useful in problem solving.				
Expect ed Outco me:	After completion of this course student will be able to • Understand and use the process of abstraction using a programming language such as'C'. • Analyze step by step and develop algorithms to solve real world problems. Implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs. • Understanding various searching & sorting techniques.				
Module 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

Module II	**Stacks and Queues: 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.

Module III	**Trees: Basic terminology**				

Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary 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.
Binary Search Trees(BST), Insertion and Deletion in BST, Complexity ofSearch Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees

Module 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		
Module V	**Searching and sorting**	
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. (7)		

Hashing: Hash Function, Collision Resolution Strategies Storage Management: Garbage Collection and Compaction. External sorting: tape sorting disk sorting
RefrenceBooks
1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI 2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication 3. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill 4. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education 5. Lipschutz, "Data Structures" Schaum's Outline Series, TMH 6. G A V Pai, "Data Structures and Algorithms", TMH

Mode of Evaluation	Tutorials / Class Tests / Lab Exam
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

Name of The Course	Data Communication				
Course Code	CSE214				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

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

Course Outcomes

CO1	Understand the different networking sub-systems and their functions in a telecommunication system.
CO2	Understand and configure the different types of network topologies and protocols.
CO3	Understand the different protocols layers of the OSI model.
CO4	Examine and analyze the network-layer concepts like Network-Layer services – Routing -IP protocol -IP addressing
CO5	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

Text Book (s)

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

Reference Book (s):

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

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

6. Understand the structure of computer networks, factors affecting computer networkdeployment.
7. Describe emerging technology in the net-centric computing area and assess their currentcapabilities, limitations and potential applications.
8. Program and analyse network protocols, architecture, algorithms and other safety criticalissues in real-life scenario.

Course Outcomes

CO1	Understand the different networking sub-systems and their functions in atelecommunication system.
CO2	Understand and configure the different types of network topologies and protocols.
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CO4	Examine and analyze the network-layer concepts like Network-Layer services – Routing -IP protocol -IP addressing
CO5	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

Text Book (s)

1. Forouzan, Data Communications and Networking, McGraw Hill, 4th ed.

2. Tannenbaum, Computer Networks ,Pearsoned Education.

Reference Book (s):

3. William Stallings,Data and Computer Communications, Pearsoned Education
4. Hykins, Analog and Digital Communications, Wiley Publications.

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.		

Continuous Assessment Pattern

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

CSE121	OBJECT ORIENTED PROGRAMMING	3	0	0	3
Version No.	1.0				
Prerequisite	CSE101				
Objectives:	_ Understand practicalities and contexts that call for imperative style programming. _ Evaluate variable scopes, memory management, and reference versus value types in relation to parameters and arguments in function calls. _ Understand key merits of object- o r i e n t e d programming in comparison with alternative orientations and class design principles. _ Understand principles of combining sub-classing and interfaces in designing class hierarchies. _ Understand motivations for literate programming, self-documentation, good coding style practices in program design and testing.				
Expected Outcome:	On successful completion of the course students should be able to: _ Implement calculation and visualization tasks in imperative style programming and using strictly typed languages. _ Demonstrate informed use static and non-static scopes in programs and classes.				

	_ Describe reference types and value types and demonstrate their use in programming problems. _ Demonstrate best practices in designing classes and class hierarchies from problem statements using sub-classing, abstract classes, and interfaces to achieve polymorphism in objectoriented software. Describe consequences of the lack or presence of multiple inheritance for their design. _ Demonstrate informed use of encapsulation within and across software components and packages. _ Apply exception handling, generation and escalation mechanisms and practices in writing Java programs. _ Apply self, mutual, or circular references to satisfy data representation in problems and construct mutable data structures. _ Practice self documentation and consistent coding style in writing programs.	
Module I	**Introduction:**	

The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modeling, principles of modeling, Object oriented modeling, Introduction to UML, conceptual model of the UML, Architecture.

Module II	Basic Structural Modeling:	

Classes, Relationships, common Mechanisms, and diagrams. Class&Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration Diagrams, iterated messages, use of self in messages. Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, callback mechanism, broadcast messages. Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams, State Machine ,Process and thread, Event and signals, Time diagram, interaction diagram, Package diagram.Architectural Modeling:Component, Deployment, Component diagrams and Deploymentdiagrams.

Module III	Object Oriented Analysis & Design	

Object Oriented Analysis, Object oriented design, Object design, Combining three models,Designing algorithms, design optimization, Implementation of control, Adjustment ofinheritance, Object representation, Physical packaging, Documenting design considerations.Structured analysis and structured design (SA/SD), Jackson Structured Development (JSD).Mapping object oriented concepts using non-objeile ct oriented language, Translating classes intodata structures, Passing arguments to methods, Implementing inheritance, associations encapsulation. Object oriented programming style: reusability, extensibility, robustness, programming in the large. Procedural v/s OOP, Object oriented language features. Abstraction and Encapsulation.

Module IV	Introduction to Java	

History, Features, Object Oriented concept of Java, Classes and Objects,Inheritance, Packages, Interface , abstract method and classes, Polymorphism, Inner classes,String Handling, I/O , Networking, Event Handling. Multi threading, Collection, Java APIs,Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files,

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Introspection,Developing a simple bean, using Bound properties, The Java Beans API,Session Beans, EntityBeans, Introduction to Enterprise Java beans (EJB).

Module V	Advanced Java	

Java Swing: Introduction to AWT, AWT v/s Swing, Creating a Swing Applet and Application.Utility of Java as internet programming language, JDBC, The connectivity model, JDBC/ODBCBridge, Introduction to servlets.

References	

1. James Rumbaugh et. al, "Object Oriented Modeling and Design", PHI
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language UserGuide", Pearson Education
3. Naughton, Schildt, "The Complete Reference JAVA2", TMH
4. Mark Priestley "Practical Object-Oriented Design with UML", TMH
5. Booch, Maksimchuk, Engle, Young, Conallen and Houstan, "Object Oriented Analysisand Design with Applicile ations", Pearson Education
6. Pandey, Tiwari, " Object Oriented Programming with JAVA" , Acme Learning

Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

CSE216	**DIGITAL DESIGN**	**3**	**0**	**4**

Version No.	1.0
Prerequisite	EEE101
Course Description:	The course introduces Boolean algebra, Reduction techniques and demonstrates the design of logic gates. Knowledge of digital systems design based on combinational and sequential logic is also imparted.
Expected Outcome:	On completion of this course, the students will be able to 4. Realize minimization methods using Boolean algebra. 5. Explain on digital logic families. 6. Design sequential and combinational digital circuits.

Unit I	**Number System and Boolean Algebra**	

Review of number system; types and conversion, codes. Boolean algebra: De-Morgan's theorem, switching functions and simplification using K-maps & Quine McCluskey method.

Unit II	**Combinational Circuits**	

Design of Logic gates. Design of adder, subtractor, comparators, code converters, encoders, decoders, multiplexers and demultiplexers, Function realization using gates& multiplexers.

Unit III	**Synchronous Sequential Circuits**	

Flip flops - SR, D, JK and T. Analysis of synchronous sequential circuits; design of synchronous sequential circuits – Counters, state diagram; state reduction; state assignment.

Unit IV	**Asynchoronous Sequential Circuits**	

Analysis of asynchronous sequential machines, state assignment, asynchronous design problem.

Unit V	**PLD, Memories and Logic Families**	

Memories: ROM, PROM, EPROM, PLA, PLD, FPGA, digital logic families: TTL, ECL,CMOS.

Text Books	

1. M. Morris Mano, 'Digital Logic and Computer Design', Prentice Hall of India, 2002.

2. John M.Yarbrough, 'Digital Logic, Application & Design', Thomson, 2002.

References:	
1. Charles H.Roth, 'Fundamentals Logic Design', Jaico Publishing, IV edition, 2002. 2. Floyd, 'Digital Fundamentals', 8th edition, Pearson Education, 2003. 3. John F.Wakerly, 'Digital Design Principles and Practice', 3rd edition, Pearson Education, 2002	
Mode of Evaluation	Tests / Quiz / Assignment / Term End Exam / Lab Exam
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

Name of The Course	Data Structures and Algorithms Lab
Course Code	CSE252
Prerequisite	
Corequisite	
Antirequisite	

	L	T	P	C
	0	0	2	1

Course Objectives:

Understand the data structure shortest path algorithms involving complicated data structures like Graphs.

Course Outcomes

CO1	Understand the comparison and use of Recursion and Loops.
CO2	Understand the application of linear data structure(s) to solve various problems.
CO3	Understand the application of non-linear data structure(s) to solve various problems.

CO4	Understand the shortest path algorithms involving complicated data structures like Graphs.
CO5	Become expert in calculating and comparing complexities of various searching and sorting algorithms.

Text Book

1. Cormen T.H., Leiserson, C.E., Rivest, R.L., and C. Stein. Introduction to Algorithms,MIT Press, Second Edition (Indian reprint: Prentice-Hall), 2013.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Pearson, 4thEdition, 2014.

References

1. "Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein "Data StructuresUsing C and C++" , PHI, 1996."
2. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill, 2007.
3. R. Kruse, "Data Structures and Program Design in C++", Pearson Education, 2000.

Name of The Course	Digital Design Lab
Course Code	CSE256
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 posforms.
- 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

CSE141	**OBJECT ORIENTED PROGRAMMING LAB**	0	0	2	1

Version No.	1.4

Prerequisite	

Objectives:	The objective of the course is to introduce the Basic concepts of Oops and how these concepts are useful in problem solving.

Expected Outcome:	After completion of this course student will be able to • Understand and use the process of abstraction using Oops through Java • Analyze step by step and develop algorithms to solve real world problems. • Understanding Classes, Interface, Event Handling ,AWT, Java Swing and Java Beans.

Write a Program in Oops for following:
- Write a Program to Print Welcome.
- Write a Program to print factorial of a Number
- Write a Program to show constructor overloading
- Write a Program to call objects using This keyword.
- Write a Program to inherit properties of one class to another.
- Write a program in Java for illustrating overloading, over riding and various forms of inheritance.
- Write a Program for Exception handling using try, catch, throw, throw finally
- Write a programs in Java for event handling Mouse and Keyboard events.
- Write a programs to create packages and multiple threads in Java.
- Write a programs in Java to create and manipulate Text Area, Canvas, Scroll Bars, Frames, and Menus using swing/AWT.
- Write a Program to create Login form using Applet

Text Books	

References	

Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

MAT-221	Numerical Methods	L	T	P	C
		3	0	0	3

Version No.	1.0

Prerequisite	
Objectives:	To enhance the problem solving skills of engineering students using an extremely powerful problem solving tool namely numerical methods. The tool is capable of handling large system of equations, non linearities and complicated geometries that are not uncommon in engineering practice and that are often impossible to solve analytically.
Expected Outcome:	On completion of this course students will 1. Understand the need of Numerical techniques. 2. Understand the issues related to numerical techniques. 3. Be able to use the various techniques in solving problems
Module I	Approximation and Errors in computing	

Approximation and Errors in computing: Introduction, Significant digits, Inherent error, Rounding error, Truncation error, Absolute and relative error, Error propagation..

Module II	Roots of Non Linear Equations and solution of system of LinearEquations:	

Roots of Non Linear Equations and solution of system of Linear Equations: Bisection method, False position Method, Newton-Raphson Method, fixed – point method, Muller's method for complex and multiple roots, convergence of Bisection, Newton-Raphson's and False position methods, Gauss Elimination method by pivoting, Gauss – Jordan method, Gauss – Seidel method, Relaxation method, convergence of iteration methods.

Module III	Difference Operators & Interpolation:	

Difference Operators & Interpolation: Forward and Backward difference operators and table, Interpolation with equidistant point, Lagrange Interpolation Polynomial, Newton Interpolating Polynomial using divided Difference Table.

Module IV	Numerical Differentiation and Integration	

Numerical Differentiation and Integration :Differentiating continuous functions, differentiating tabulated functions, Higher order derivatives, Richardson'sExtrapolation, Newton – cotes integration formula, Trapezoidal rule, Simpson's rule,
Boole's rule and Weddle's rule, Romberg's Integration .

Module V	Numerical Solution of Ordinary and Partial Differential Equations

Numerical Solution of Ordinary and Partial Differential Equations :Taylor series method, Euler and modified Euler method, Runge Kutta methods, Milne's method, Adams – Bashforth-Moulton method, Finite differences approximations of partial derivatives, Solution of Laplace equation(Elliptic)by standard 5 – point formula , solution of one dimensional heat equation(Parabolic)by Bender-Schmidt method, crank – Nicolson method, Solution of one dimensional wave equation(Hyperbolic) by iterative method.

References	

1. Numerical Method : E. Balagurusamy ,Tata McGraw Hill Publication.

2. Applied Numerical Analysis : *Curtis F. Gerald and Patrick O. Wheatley* – Pearson Education Lt

3. Introductory Methods of Numerical Analysis : *S.S. Sastry*, PHI learning Pvt Ltd.

4. Numerical Methods for Scientific and Engineering computation : M.K Jain, S.R.K Iyengar and R.K Jain, New age International Publishers.

Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

CSE213	**COMPUTER ORGANIZATION & ARCHITECTURE**	3	0	0	3
Version No.	1.0				
Prerequisite	-				
Module I	**BASIC STRUCTURE OF COMPUTERS**				

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

Module II	**ARITHMETIC MODULE**	

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

Module III	**BASIC PROCESSING MODULE**	

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

Module IV	**MEMORY SYSTEM**	

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

Module V	**Input / Output**	

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).
Text Book: 1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition "Computer Organization", McGraw-Hill, 2002.

References	

1. Patterson, Computer Organisation and Design, Elsevier Pub. 2009
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6th Edition, Pearson Education, 2003.
3. David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware / software interface", 2nd Edition, Morgan Kaufmann, 2002.

4. John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw Hill, 1998.	
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

CSE221	**THEORY OF AUTOMATA AND FORMAL LANGUAGES**	3	1	0	4
Version No.	1.0				
Prerequisite	CSE103				
Objectives:	The major objective of this course is to introduce the student to the concepts of theory of computation in computer science. The student should acquire insights into the relationship among formal languages, formal grammars, and automata.				
ExpectedOutcome:	This course will give a student fundamental theoretical and practical knowledge about: - Regular languages and finite automata - Context-free languages and pushdown-automata - Recursively enumerable languages and Turing machines - The Universal Turing machine - Decidability - Stop problem - Computating paradigms				
Module I	**Introduction;**				

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

Module 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 Regu lar Languages, Decision properti es of Regular Languages,
FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

Module III	**Context free grammar (CFG) and Contex t Freee Languages CFL):**	

Definition, Examples, Derivation , Derivation trees, Am biguity in Grammer, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless sym bols, Simplification of CFGs,
Normal forms for CFGs: CNF and GNF, Closure proper ties of CFLs, Decision Propertiesof CFLs: Emptiness, Finiteness and Memership, Pumping lemma for CFLs,

Module 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 andCFG, CFG
to PDA and PDA to CFG, Two stack PDA

Module V	Turing machines (TM):

Basic model, definit ion and representatio n, Instantaneous Description,Language acceptance
by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM,
Chur ch'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

References:
1. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation",
Pearson Education
2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata,
   Languages and Computation", PHI
3. Martin J. C., "Introduction to Languages and Theory of Computations", TMH
4. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI

CSE222	**OPERATING SYSTEM**	3	0	0	3
Version No.	1.0				
Prerequisite					
Objectives:	• Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc., • Understand how the operating system abstractions can be used in the development of application programs, or to build higher level abstractions, • Understand how the operating system abstractions can be implemented, • Understand the principles of concurrency and synchronization, and apply them to write correct concurrent programs/software, • Understand basic resource management techniques (scheduling or time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection.				
Expected Outcome:	Student will be able to a. Student achieve proficiency in computer science knowledge (fundamentals of programming, computer organization, data structures, software engineering). b. Students demonstrate ability to design, implement and evaluate a computer-based system, process, components, or program to meet desired needs. c. Students demonstrate ability in applying their major knowledge to practical problems.				
Module I	**Introduction :**				

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

Module II	**Concurrent Processes:**	

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
PhilosopherProblem, Sleeping Barber Problem; Inter Process Communication models and
Schemes, Process
generation.

Module III	CPU Scheduling:	

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.

Module IV	Memory Management	

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with
fixedpartitions, Multiprogramming with variable partitions, Protection schemes,Paging,
Segmentation, Paged segmentation, Virtual memory concepts, Demand paging,
Performance ofdemand paging, Page replacement algorithms, Thrashing, Cachememory
organization, Localityof reference.

Module V	Input/Output **and Disk scheduling**	

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

References	

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
3. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition,

Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

Name of The Course	Database Management Systems				
Course Code	BCSE312				
Prerequisite	Structures and Algorithms", "Discrete Mathematics"				
Corequisite	"C-Programming"				
Antirequisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. Develop the ability to design, implement and manipulate databases.
2. Introduce students to build data base management systems.
3. Able to store and analyze data into normalized format.
4. 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):

1. T2. Date C J, " An Introduction to Database Systems", Addision Wesley
2. T3. Elmasri, Navathe, " Fudamentals of Database Systems", Addision Wesley
3. T4. O'Neil, Databases, Elsevier Pub.
4. T5: Leon & Leon,"Database Management Systems", Vikas Publishing House
5. T6: Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications
6. T7: Majumdar & Bhattacharya, "Database Management System", TMH (14)
7. T8: Ramkrishnan, Gehrke, " Database Management System", McGraw Hill

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

Mode of Evaluation

Components	Theory	
	Internal	SEE
Marks	50	50
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	Course Outcomes (COs)	Mapped Programme Outcomes
1	Apply the concept of demand.	1, 2,5,11
2	Estimate production and cost function.	1, 2,5,11
3	Formulate appropriate pricing strategies	1, 2,5,11

MGT-302 INDUSTRIAL ECONOMICS AND MANAGEMENT		
1	1	Engineering Knowledge
2	2	Problem analysis
	3	Design/development of solutions
	4	Conduct investigations of complex problems
2	5	Modern tool usage
	6	The engineer and society
	7	Environment and sustainability
	8	Ethics
	9	Individual or team work
	10	Communication
2	11	Project management and finance
	12	Life-long Learning

Name of The Course	Operating Systems Lab			
Course Code	CSE242			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives:

To understand the services provided by and to design an operating system
To understand what a process is and how processes are scheduled
To understand different approaches to memory management.

Course Outcomes

CO1	Understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks
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	Produce algorithmic solutions to process synchronization problems
CO5	

Text Book (s)

1.Silberschatz, Galvin and Gagne, "Operating Systems Concepts",Wiley, Ninth Edition, 2013.
2.D M Dhamdhere, "Operating Systems: A Concept based Approach",McGraw Hill Education, 3 edition, 2012.

CSE352	**Database Management System LAB**	0	0	2	1
Version No.	1.0				

Prerequisite	-
Objectives:	1. Develop the ability to design, implement and manipulate databases. 2. Introduce students to build data base management systems. 3. Able to store and analyze data into normalized format. 4. 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 imposingsecurity.
CO4	Able to remove various anomalies from databases.
CO5	Understanding of transaction process.

	1. Write the queries for Data Definition and Data Manipulation Language. 2. Write SQL queries using logical operations (=,<,>,etc) 3. Write SQL queries using SQL operators 4. Write SQL query using character, number, date and group functions 5. Write SQL queries for relational algebra 6. Write SQL queries for extracting data from more than one table 7. Write SQL queries for sub queries, nested queries 8. Write Programme by the use of PL/SQL 9. Concepts for ROLL BACK, COMMIT & CHECK POINTS 10. Create VIEWS, CURSORS and TRGGERS & write ASSERTIONS. 11. Create FORMS andREPORTS Note: 1. The queries to be implemented on DBMS using SQL 2. Students are advised to use Developer 2000/Oracle9i or other latest version for above experiments. However, student may use Power Builder/SQL SERVER. Mini Projects may also be planned & carried out througho ut the semester to understand important concepts of database.

Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

Name of The Course	English Proficiency and Aptitude Building -3				
Course Code	LLL222				
Prerequisite	Completion of semester 2				
Corequisite					
Antirequisite					
24 sessions of 100 minutes each, 12 hours of online tests		**L**	**T**	**P**	**C**
		3	0	4	2

Course Objectives:

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

Course Outcomes

CO1	Improve arithmetic aptitude
CO2	Learn tricks to solve aptitude questions faster, thereby saving time during competitive exams

CO3	Improve arithmetic aptitude

Text Book (s)

SLLL own text book

Reference Book (s):

1. Communication Skills for Engineers, Mishra,Sunita&C.Muralikrishna,,Pearson
2. CorporateSoftskills,SarveshGulati,2006.
3. Effective Communication,JohnAdair,MacmillanLtd.1997.
4. Developing Communication Skills, Krishna Mohanand Meera Bannerji, Macmillan IndiaLtd.1990

Continuous Assessment Pattern

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

V-SEMESTER

CSE311	**Design and Analysis of Algorithms**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE201				
Objectives:	The objective of this course is to make the students able to compare andselect appropriate algorithm for a give problem out of several posssiblesolutions.				
Expected Outcome:	Student will be able to prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains apply the algorithms and design techniques to solve problems analyze the complexities of various problems in different domains.				
Module I					

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. External sorting: tape sorting, disk sorting,
Searching tries

Module II					

Advanced Data Structures: Red-Black trees, B – trees, Binomial Heaps, Fibonacci
Heaps.

Module III					

Divide and Conquer with examples such as Sorting, Matrix Multiplication, Convex hull and Searching. Greedy methods with examples Huffman Coding, Knapsack, MinimumSpanning trees – Prim's and Kruskal's algorithms, Single source shortest
paths - Dijkstra's and Bellman Ford algorithms.

Module IV					

Dynamic programming with examples such as Kanpsack, 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.

Module V					

Selected Topics: Algebraic Computation, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

References					

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.
2. RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis of Algorithms", Mc Graw Hill, 2005.
3. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
4. Berman, Paul," Algorithms", Cengage Learning.
5. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" PearsonEducation, 2008.

Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

CSE313	**Compiler Design**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE206				
Objectives:	The objective of this course is to provide a student with an understanding of the fundamental principles in compiler design andto provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science. To learn the process of translating a modern high-level language to executable code.Grasp of compiler construction.				
Expect ed Outco me:	Ability of a compiler construction. After the course a student should have an understanding, based on knowledge of the underlying machine architecture, the limitations and efficiency of various design techniques of compilers implementation.				
Module I	**Introduction**				

Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regularexpressions and their applications to lexical analysis, Optimization of DFA-Based PatternMatchers 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 andparse trees, capabilities of CFG.

Module II	**Basic Parsing Techniques:**	

Parsers, Shift reduce parsing, operator precedence parsing, top downparsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, thecanonical Collection of LR(0) items, constructing SLR parsing tables, constructing
CanonicalLR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automaticparser generator, implementation of LR parsing tables.

Module III	**Syntax-directed Translation:**	

Syntax-directed Translation schemes, Implementation of SyntaxdirectedTranslators, Intermediate code, postfix notation, Parse trees & syntax trees, threeaddress 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, declarationsand case statements.

Module IV	**Symbol Tables:**	

Data structure for symbols tables, representing scope information. Run-TimeAdministration: Implementation of simple stack allocation scheme, storage allocation in blockstructured language. Error Detection & Recovery: Lexical Phaseerrors, syntactic phase errorssemantic errors.

Module V	Code Generation:

Design Issues, the Target Language. Addresses in the Target Code, BasicBlocks and Flow Graphs, Optimization of Basic Blocks, Code Generator.Code optimization:

Machine-Independent Optimizations, Loop optimization, DAGrepresentation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis

References:
1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", PearsonEducation
2. V Raghvan, " Principles of Compiler Design", TMH
3. Kenneth Louden," Compiler Construction", Cengage Learning.
4.. Charles Fischer and Ricard LeBlanc," Crafting a Compiler with C", Pearson Education

CSE314	**Computer Network**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE102, CSE203				
Objectives:	The students understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks. ii) The students understand the Internet structure and can see howstandard problems are solved in that context. iii) The students can analyze simple protocols and can independently study literature concerning computer networks.				
Expected Outcome:	Student will be able to Examine and analyze the following transport-layer concepts: Transport- Layer services -Reliable vs. un-reliable data transfer -TCP protocol -UDPprotocol Examine and synthesize the following network-layer concepts: - Network-Layer services –Routing -IP protocol -IP addressing Examine and evaluate the following link-layer and local area network concepts: -Link-Layer services – Ethernet -Token Ring -Error detectionand correction -ARP protocol				
Module I	**Introduction Concepts:**			
Goals and Applications of Networks, Network structure and architecture,The OSI reference model, services, Network Topology Design - Delay Analysis, Back BoneDesign, Local Access Network Design, Physical Layer Transmission Media, Switching methods,ISDN, Terminal Handling.					
Module II	**Medium Access sub layer:**			
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 Handling.					
Module III	**Network Layer:**			
Network Layer - Point - to Pont Networks, routing, Congestion controlInternetworking -TCP / IP, IP packet, IP address, IPv6.					
Module IV	**Transport Layer:**			

Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compressiontechniques, cryptography - TCP - Window Management.	
Module IV	**Application Layer:**
File Transfer, Access and Management, Electronic mail,Virtual Terminals, Other application. Example Networks - Internet and Public Networks.	
1. Forouzen, "Data Communication and Networking", TMH 2. A.S. Tanenbaum, Computer Networks, Pearson Education 3. W. Stallings, Data and Computer Communication, Macmillan Press 4. Anuranjan Misra, "Computer Networks", Acme Learning 5. G. Shanmugarathinam, "Essential of TCP/ IP", Firewall Media	

CSE322	**Software Engineering**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE101				
Objectives:	Develop complex systems (including analysis, design, construction, maintenance, quality assurance and project management) using the appropriate theory, principles, tools and processes. Use appropriate computer science and mathematics principles in the development of software systems. Solve problems in a team environment through effective use of written and oral communication skills. Have knowledge of current issues presently involved in effectively performing duties as a software practitioner in an ethical and professional manner for the benefit of society. Practice the lifelong learning needed in order to keep current as new issues emerge. Develop software in at least one application domain.				
Expected Outcome:	Student will be able to The ability to apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science and mathematics, to the development and maintenance of complex softwaresystems The ability to design and experiment with software prototypesThe ability to select and use software metrics The ability to participate productively on software project teams involving students from both software engineering and other majors Effective communications skills through oral and written reports and software documentation evaluated by both peers and faculty The ability to elicit, analyze and specify software requirements through a productive working relationship with project stakeholders				
Module I	**Introduction to Software Engineering**				

Software Components, Software Characteristics, SoftwareCrisis, Software Engineering
Processes, Similarity and Differences from ConventionalEngineering Processes, Software Quality
Attributes. Software Development Life Cycle (SDLC)Models: Water

Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models,Iterative Enhancement Models.		
Module II	**Software Requirement Specifications (SRS)**	
Requirement Engineering Process: Elicitation, Analysis, Documentation, Review andManagement of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams,Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, SoftwareQualityFrameworks, ISO 9000 Models, SEI-CMM Model.		
Module III	**Software Design**	
Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization,Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, DesignStrategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-UpDesign. Software Measurement and Metrics: Various Size Oriented Measures: Halestead'sSoftware Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures:Control Flow Graphs.		
Module IV	**Software Testing**	
Testing Objectives, Module Testing, Integration Testing, Acceptance Testing, Regression Testing,Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up TestingStrategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), FunctionalTesting (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products.Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, CodeInspection, Compliance with Design and Coding Standards.		
Module IV	**Software Maintenance and Software Project Management**	
Software as an Evolutionary Entity, Need for Maintenance, Categories of aintenance:Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, ChangeControl Process, Software Version Control, An Overview of CASE Tools. Estimation of VariousParameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO),Resource Allocation Models, Software Risk Analysis and Management.		
References		

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
4. Pankaj Jalote, Software Engineering, Wiley
5. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
6. Ian Sommerville, Software Engineering, Addison Wesley.
7. Kassem Saleh,"Software Engineering", Cengage Learning.
8. Pfleeger, Software Engineering, Macmillan Publication.

Name of The Course	OPERATING SYSTEM AND COMPUTER NETWORK			
Course Code	EMP131			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objective(s)
1. Understand the basic Unix/Linux operating system commands and system calls.
2. Develop multi-threaded application using P-thread.
3. Implement the concurrency control algorithms.
4. Implement CPU scheduling techniques, Disk scheduling techniques.
5. Implement Memory management algorithms.

Pre-quisite
>Exposure Programming in C
>Basics of Unix/Linux

Course Outcomes

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

1. Use Linux operating system for program development.

2. Use and implement System calls.

3. Design and implement multithreaded applications using p-thread libraries.

4. Implement Concurrency & synchronization Semaphores/monitors, shared memory,   mutual exclusion Process scheduling services

5. Implement CPU scheduling techniques, Disk scheduling techniques and Memory

   Management algorithms

Text Books and Reference Books

TEXT BOOKS
1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition.
REFERENCE BOOKS
1. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
2. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
3. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition

S. No.	Title of Lab Experiments
1	Introduction to basis Linux commands and application development through C on Linux environment
2	Write programs using the following system calls of LINUX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
3	Write programs using the I/O system calls of LINUX operating system (open, read, write, etc)
4	Write C programs to simulate LINUX commands like ls, grep, etc.
5	Write a program using P-thread, where main thread calculates number of lines in a file and child calculates number of words
6	Write a program to implement process scheduling mechanisms using FCFS & SJF.
7	Write a program to implement process scheduling mechanisms using Priority & round-robin scheduling
8	Write a program solving the Producer-Consumer problem using semaphores
9	Write a program to implement the solution for dining philosopher's problem
10	Write a program to develop an application using Inter process communication using shared Memory
11	Write a program to implement the banker's algorith
12	Write a program to implement memory allocation using first fit algorithm
13	Write a program to implement memory allocation using best fit algorithm
14	Write a program to implement memory allocation using worst fit algorithm.
15	Write a program to implement the page replacement algorithms.

	VALUE ADDED EXPERIMENT:
1	Implement any file allocation technique (Linked, Indexed or Contiguous.
2	Simulate Paging Technique of Memory Management

Course Name	Java Programming Basics				
Course Code	EMP132				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:

Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's. Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

Course Outcomes

CO1	Understand basic web concepts and Internet protocols.
CO2	Understand CGI Concepts & CGI Programming.
CO3	Analyze Scripting Languages.
CO4	Analyze Scripting Languages.
CO5	Design SERVELETS AND JSP.

Text Book (s)

1	IvanBayross -Web Enabled Commercial Application Development Using HTML, DHTML, Java Script, Perl, CGI-2000
2	Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
3	Paul Dietel and Harvey Deitel,"Java How to Program", Prentice Hall India Learning Private Limited

Reference Book (s)

1	Mahesh P. Matha, "Core Java A Comprehensive study", Prentice Hall of India,2011.

2	UttamK.Roy, "Web Technologies", Oxford University Press, 2011.

Unit I:	8 lecture hours
Introduction to web, protocols governing the web, web development strategies, web applications, web project, web team.	

Unit II:	8 lecture hours
HTML: list, table, images, frames, forms, CSS;XML: DTD, XML schemes, presenting andusing XML	

Unit III:	8 lecture hours
Java script: Introduction, documents, forms, statements, functions, objects; Event and eventhandling; introduction to AJAX.	

Unit IV:	8 lecture hours
Java server pages (JSP), JSP application design, declaring variables and methods, debugging, sharing data between JSP pages, JSP objects, Session, development of java beansin Jsp, data base action with JSP.	

Unit V:	8 lecture hours
Unit V: PHP (Hypertext Preprocessor): Introduction, syntax, variables, strings, operators, if- else, loop, switch, array, function, form ,mail, file upload, session, error, exception, filter, PHP-ODBC.	

Continuous Assessment Pattern

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

Name of The Course	WEB PROGRAMMING THROUGH PHP & HTML			
Course Code	CSE123			
Prerequisite				
Co-requisite				
Anti-requisite				
		L	**T**	**P**	**C**
		3	0	0	3

▪ **Unit 1 - PHP Basics**

Introduction to PHP , Support for Database, PHP Installation, Working with PHP, Why PHP?, Basic Syntax of PHP, PHP statement terminator and case insensitivity, Embedding PHP in HTML, Comments, Variables, Assigning value to a variable, Constants, Managing Variables.

• **Unit II - Operators and Controls Structures**

Arithmetic Operators, Bit-wise Operators, Comparison Operators, Logical Operators, Concatenation Operator, Incrementing/Decrementing Operator, Ternary Operator, Operator Precedence, String Manipulation: strtoupper(), strtolower(), ucfirst(), ucwords(), strcmp(), strlen(), substr(), trim(), Conditional Control Structures: If statement, If- else statement, If- else if statement, Nested If, Switch statement, Looping Control Structures: For loop, While loop, Do- While loop, For-each, Loop control: Break and Continue.

1. **Unit III Functions in PHP**

Functions, User-Defined function, Function Definition, Function Call, Function with arguments, Function with return value, Call by value and call by references, Understanding variable scope, Global Variables, Static Variables, Include and Require, Built-in functions in PHP.

1. **Unit IV Arrays**

Introduction to Array, Array in PHP, Creating an Array, Accessing Elements of an Array, Modifying Elements of an Array, Finding the Size of an Array, Printing an Array in the readable Way, Iterating Array Elements, Modifying Array while iteration, Iterating Array with Numeric index, Removing Element from an Array, Converting an Array to String, Converting String to an Array, Array Sorting, Multidimensional Array, Accessing elements of a Multidimensional Array, Iterating Multidimensional Array.

1. **Unit V PHP File Handling**

Introduction, File Open, File Creation, Writing to files, Reading from File, Searching a record from a file, Closing a File, Using PHP With HTML Forms.

1. **Unit VI Class and Object**

Introduction, Object, Class, Defining Class in PHP, Object in PHP, Usage of $this variable, Constructor, Constructor with Parameters.

▪ **Unit VII Exception Handling**

Introduction to Exception, Exception Handling mechanisms, Creating Custom Exceptions, Multiple Catch Blocks, Exception Propagation, Error Handling in PHP.

Name of The Course	Programming in Python				
Course Code	CSE200				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

To understand the basic Gain knowledge of Basic Programming with Python

Course Outcomes

CO1	Gain knowledge of Basic Programming with Python **(K3)**
CO2	Familiarize with python string handling techniques and user defined functions **(K4)**
CO3	Understand and use data structures like Lists, tuples, and dictionaries **(K3)**
CO4	Understand File handling **(K3)**
CO5	Use object oriented programming techniques **(K3)**

Text Book (s)

1. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
2. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
3. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education
4. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication

Reference Book (s)

1. Downey, Allen B., Think Python: How to Think Like a Computer Scientist. O'Reilly, 2012. Obtain free PDF at http://www.greenteapress.com/thinkpython/
2. Python Programming: An Introduction to Computer Science (Second Edition) John Zelle, ISBN 978-1-59028-241-0-9, Franklin, Beedle & Associates Inc., 2004.

Course Content

Unit I:Introduction	8 Lab hours
History, Features, Working with Python, Installing Python, basic python syntax, interactive shell, editing, saving, and running a script. Tokens: Keywords, , Identifiers, Literals, Operators, data types; variables, assignments; immutable variables; numerical types; Operators and Boolean expressions.	
Debugging, comments in the program; understanding error messages; Built-in functions – type(), id(), eval(), random, chr(), ord();	

Unit II: Condition Control Structures & Input Output	8 Lab hours
Conditional Statements: If, If-else, Nested if-else; Loops: For, While, Nested loops; Control Statements: Break, Continue, Pass; Input and output: Taking input from user through keyboard, manipulation of input, formatted input, formatted output.	

Unit III:Function and Strings	8 Lab hours
Functions in Python: Defining a function, Calling a function, Types of functions, Function Arguments, Global and local variables. Strings: Single quoted, double quoted & triple quoted, String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa.	

Unit IV:Lists, Tuples and Dictionaries	8 Lab hours
Basic List operators, iterating over a list, replacing, inserting, removing an element; searching and sorting lists, calculating the sum and average of items in a list ; Tuples - sequence of values , immutability, Comparing tuples, Tuple assignment: Dictionary- Store data as key-value pairs in dictionaries, search for values, change existing values, add new, key-value pairs, and delete key-value pairs, nesting objects, sorting, dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.	

Unit V:Files, Regular Expressions& Modules	8 Lab hours
Reading/writing text and numbers from/to a file in text files and csv files; Regular expressions, importing and creating modules: Manipulating files and directories using os module.	

Continuous Assessment Pattern

Components	Laboratory evaluation scheme	
	End Term Internal Exam Practical (IEP) (50)	**End Term ExternalExam PracticalEEP (50)**
Marks Distribution	Continuous Assessment (30) [Evaluated throughout the semester] + Viva Voce(10) + Lab Question(10) [Evaluated on IEP exam day]	50 Marks Evaluated on ExternalExam Practical (EEP) day (Viva + Question) = 50 Marks
Total Marks	**100**	

Name of The Course	INTRODUCTION TO CLOUD COMPUTING				
Course Code	CSE461				
Prerequisite					
Co requisite					
Antirequisite					
		L	**T**	**P**	**C**
		3	**0**	0	3

Course Objectives:

To understand the concepts of cloud computing technologies. To gain expertise in server, network and storage cloud.· To understand and deploy practical cloud solutions and enterprise solutions· To gain knowledge on the concept of virtualization that is fundamental to cloud computing· To understand the various issues in cloud computing· To be able to set up a private cloud· To understand the security issues in the grid and the cloud environment·

Course Outcomes

CO1	Identify the architecture, infrastructure and delivery models of cloud computing
CO2	Understand advanced and emerging cloud computing technologies
CO3	Obtain skills to do advanced Cloud Platform Architecture
CO4	Develop services using Cloud computing

CO5	Apply the security models in the cloud environment.

Text Book (s)

1	Nick Antonopoulos, Cloud computing, Springer Publications, 2010
2	Humble Devassy,"Mastering KVM Virtualization",Kindle edition, ISBN-13: 9781784396916,2016
3	Enterprise Cloud Computing by GautamShroff, Cambridge,2010

Reference Book (s)

1	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012
2	John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010
3	Tom White, "Hadoop: The Definitive Guide", Yahoo Press, 2012
4	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", McGraw-Hill Osborne Media, 2009.
5	Tim Mather, Subra Kumaraswamy, and Shahed Latif ,"Cloud Security and Privacy", O'Reilly Media, Inc.,2009
6	https://www.amazon.com/Value-Virtualization-Cloud-Computing- accelerate/dp/1492198331 Data centres and cloud computing: https://www.youtube.com/watch?v=_fGrYN5rxhs

Course Contents:

Unit I: Introduction	8 hours
Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.	
Unit II: Trends and Technologies Development	**8 hours**
Introduction about recent development in cloud, trends and technologies innovations in cloud,discuss about IBM cloud, AWS cloud, Microsoft cloud, etc, and explore the future of cloud computing, use of cloud computing technologies in various fields	
Unit III : Cloud Platform Architecture	**9 Hours**
Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software- A Generic Cloud Architecture Design – Layered cloud Architectural Development – Virtualization Support and Disaster Recovery – Architectural Design Challenges	
Unit IV : Programming Model	**9 Hours**
Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job –Developing Map Reduce Applications - Design of Hadoop file system –Setting up Hadoop Cluster - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Nimbus	

Unit V : Cloud Security	9 Hours
Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices inthe cloud, SaaS, PaaS, IaaS availability in the cloud - Key privacy issues in the cloud –CloudSecurity and Trust Management	

Name of The Course	Introduction of IOT
Course Code	CSIO 101
Prerequisite	Theoretical understanding of basic electronics.
Co requisite	Understand general theoretical concepts of Internet of Things.
Antirequisite	None

	L	T	P	C
	3	0	0	3

Course Content:

UNIT - I Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT - II IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT - III Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling. Python packages - JSON, XML, HTTP Lib, URL Lib, SMTP Lib. R16 B.TECH CSE.

UNIT - IV IoT Physical Devices and Endpoints - Introduction to Raspberry PI - Interfaces (serial, SPI, I2C). Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs. Web server – Web server for IoT, Cloud for IoT, Python web application framework. Designing a RESTful web API

CSE372	Wireless and Mobile Computing	L 3	T 0	P 0	C 3

Version No.	1.0
Prerequisite	ECE206,ECE303
Objectives:	This course deals with the Introduction of wireless communication ,Mobile Communication standards & systems and keeps abreast of the future of mobile communication.
Expected Outcome :	At the end of the course, the student will be able to 1. Understand principles of wireless communication 2. Have knowledge on cellular concepts and radio propogation models 3. Understand 2G and 3G Wireless networks 4. Have a knowledge in Channel coding and Diversity 5. Understand various Modulation techniques for Mobile Radio.
Unit I	Introduction to Wireless Communications	
History and evolution of mobile radio systems. Types of mobile wireless services/systems- Cellular, WLL, Paging, Satellite systems, Standards, Future trends in personal wireless systems.		
Unit II	Cellular Concepts and System Design Fundamentals	
Cellular concept and frequency reuse, Multiple Access Schemes, channel assignment and handoff, Interference and system capacity, Trunking and Erlang capacity calculations.		
Unit III	Mobile radio Propagation Models	
Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading and Base band impulse respond models, parameters of mobile multipath channels, Antenna systems in mobile radio.		
Unit IV	Modulation Techniques	
Overview analog and digital modulation techniques, Performance of various modulation techniques-Spectral efficiency, Error-rate, Power Amplification, Equalizing Rake receiver concepts, Diversity and space-time processing, Speech coding and channel coding.		
Unit V	System Examples and Design Issues	
Multiple Access Techniques-FDMA, TDMA and CDMA systems, operational systems, Wireless networking, design issues in personal wireless systems		
Text Books	
1. T.S.Rappaport, Wireless digital communications; Principles and practice, Prentice H NJ, 1996. 2. Schiller, Mobile Communications; Pearson Education Asia Ltd., 2000.	

Reference Books	

1. K.Feher, Wireless digital communications, PHI, New Delhi, 1999.
2. W.C.Y.Lee, Mobile communications Engineering: Theory And Applications, Second Edition, McGraw Hill, New York.1998.

Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

	APP DEVELOPMENT FOR ANDROID		L	T	P	C
CSE-301						
Version No. 1.0	Dateof Approval: Jun XX,201 3		3	0	0	3
Prerequisite	Basic Knowledge ofXML, Java.					
co-requisites						

Course Objectives

The objective of this course is to:

1. STUDENTS SHOULD BE ABLE TO UNDERSTAND THE BASICS OF ANDROID OS
2. STUDENT ABLE TO CREATE ACTIVITIES
3. STUDENT ABLE TO USE INTENTS FOR ACTIVITY COMMUNICATION
4. STUDENT ABLE TO DEVELOP THE GUI

	Course Outcome	Program Outcomes Addressed (ABET)	Program Outcomes Addressed (NBA)
1.	**TO** UNDERSTAND ANDROID APPLICATION HIERARCHY, UI COMPONENTS AND THEIR PURPOSE.		PO1, PO2
2.	**To** Create activity, activity communication using intents and transfer data between /among intents.		PO3, PO9, PO10
3.	**To** Apply style to android UI components		PO3, PO5
4.	**To** use and implement menus, notifications & implement notification using NotificationCompat.Builder class		PO3, PO4, PSO3
5.	To Configure and implement context menu and option menu as a part of android app		PO5,PSO2,PO11
6.	To Deploy and test the applications using Android AVD.		PO5, PO8

Catalog Description
The purpose of this course is to give an understanding of the business scope and impact of social media. Further student will be able to apply the analytics in the social media data to predict the future trend.

Text Books
1. T1 OSS Mobile Platform (IBM ICE Publication)

Reference Books

1. Beginning Android 4 Application Development, Wei-Meng Lee

2. Mobile Computing: Concepts Methodologies, Tools & Applications – David Tainar
3. Mobile technology consumption – Barbara L Ciaramtaro

Course Content

Unit I: Introduction and Architecture of Android   5 lecture hours
History of Android, Features of Android, Android Devices, Android Versions, Open Handset Alliance (OHA) , Advantages of Android, Comparing Android with other platform, Architecture of Android. Android Directory Structure, Structure of Manifest files, Android Development Tools.

Unit II: Components of Android   10 lecture hours

Activities, Activity life cycle, Fragment, fragment lifecycle, Services, service life cycle, Broadcast receivers, Content providers, Intents, types of intents, Intent Filter, Starting a new activity, Sending and Receiving of data, Notifications

Unit III: User Interfaces   10 lecture hours

Views, Views Group, Widgets - Button, EditText, CheckBox, ToggleButton, Spinner, Picker, Layouts, Styles, Themes, Events, Event listener, Orientation, Screen Size and Density, Unit of measurement - px, dp, sp and dpi,pt, conversion of dp to px

Unit IV: Advance App Development   10 lecture hours
SQLite database, SQLiteOpenHelper, Cursors and content values, Opening and closing Database, Sensors, Bluetooth, GeoLocation, SMS & MMS, Graphics and Animation

Unit V: Security, Publishing, Monetizing   5 lecture hours
Security Creating a signing certificate, Signing your applications for distribution, Publishing on Google Play, Monetization strategies, Application promotion strategies, Using Google Analytics

Mode of Evaluation:
1. Quiz
2. Assignments/Presentation/Case Study/ Group Projects/Term Paper…
3. Continuous Assessment Tests CAT-1 and CAT2
4. Semester End Examination ETE

S.No	Unit	Assessment Methods
1	Unit-1	Assignment-1, Quiz 1, CAT-1, and ETE

2	Unit-2	CAT-1 and ETE, mini project on RMI
3	Unit-3	Assignment-2, Quiz 2, CAT-2, and ETE
4	Unit-4	Simulation using DAJ, , CAT-2, and ETE
5	Unit-5	Assignment-3, Write up on HADOOP, Self learning (NPTEL lectures) ETE

	Theory	
Components	**Internal**	**ETE**
Marks	50	50
Total Marks	100	

Name of The Course	Design & Analysis of Algorithms Lab				
Course Code	CSE351				
Prerequisite					
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		0	**0**	2	1

Course Objectives:

To identify and apply the concept of computational intractability.

Course Outcomes

CO1	To analyze the running time of asymptotic algorithm.
CO2	To develop algorithms for sorting, searching, insertion and matching.
CO3	To identify and apply the concept of computational intractability.
CO4	Apply the algorithms and design techniques to solve problems
CO5	Analyze the complexities of various problems in different domains.

Text Book(s)/ReferenceBook (s)

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest,
"Introduction toAlgorithms", Printice Hall of India.
2. RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis
of Algorithms", Mc Graw Hill, 2005.
3. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
4. Berman, Paul," Algorithms", Cengage Learning.
5. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson
Education, 2008.

List of Experiments:

1. Write a program to sort given set of numbers in ascending/descending order using

    Bubblesort and also search a number using binary search.

2. Write a program to sort given set of numbers in ascending/descending order using Insertionsort and also search a number using linear search.

3. Write a program to sort given set of numbers in ascending/descending order using Quicksort and any other sorting algorithm. Also record the time taken by these two programs and compare them.

4. Write a program to sort given set of numbers using Heap sort.

5. Write a program to sort given set of numbers Merge Sort.

6. Write a program to sort given set of numbers Counting Sort.

7. Write a program to implement Strassen's Matrix Multiplication by Divide and Conquer

8. Write a program to implement Knapsack using Greedy technique.

9. Write a program to implement Knapsack using Dynamic programming.

10. Write a program to implement Dijkstra's Algorithm.

11. Write a program to implement n-Queen Problem using backtracking.

12. Write a program to implement String Matching using Rabin-Karp algorithm.

Continuous Assessment Pattern

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

CSE353	**Compiler Design Lab**				
Version No.	1.0				
Prerequisite					
Objectives:	The objective of the course is to introduce the techniques required to develop the different units of a compiler such as lexical analyzer, parser,code optmizer.				
Expected Outcome:	After completion of this course student will be able to • develop lexical analyzer and parser etc. in C • use YACC and LEX tools • Understand how to practically implement code optimization andregister allocation concepts				

- **Write a program in C/C++ for lexical analyasis.**
- **Write programs in C/C++ for removal of left recursion and left factoring.**
- **To generate simple lexical analyzers using LEX tool.**
- **To generate simple parsers using YACC tool.**
- **Write programs in C for Code Optimization and register allocation**

Text Books	
References	
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

Name of The Course	COMPUTER NETWORK **Lab**				
Course Code	**CSE354**				
Prerequisite					
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives:

This course is designed to help organizations understand Data communication in computer network and learn working of different networking protocols. Student can also have understanding about various routing protocols and how they used in different types of computer network. This course also describe basic idea about security concern in computer network

Course Outcomes

CO1	Understand the basics of various transmission media and networks.
CO2	Compare and analyze various types of signals and conversion.
CO3	Analyze the various Data Link layer protocols and IEEE standards.
CO4	Analyze the network-layer, transport layer protocols, compression and security mechanism.
CO5	Use various application layer protocols

Text Book (s)

1	Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill, 4th edition, 2007.
2	Andrew S. Tanenbaum, Computer Networks, Pearson, Fifth Edition, 2011.

Reference Book (s)

1	William Stallings, Data and Computer Communications, Pearson,8th Edition, 2007.
2	Simon Haykin, Michael Moher, Introduction to Analog and Digital Communications, Wiley Publications, Second Edition, 2007.

	List Of Experiments
1	Introduction to basic Linux networking commands. (Commands like ipconfig, getmac, tracert, pathping, arp, ping, netstat, finger etc.)
2	Implement bit stuffing and de-stuffing
3	Write a program for hamming code generation for error detection and correction.
4	Implement cyclic redundancy check (CRC).
5	Write a program for congestion control using the leaky bucket algorithm.
6	Implement Dijkstra's algorithm to compute a shortest path through graph.
7	Take a 64-bit plain text and encrypt the same using DES algorithm.
8	Using RSA algorithm encrypts a text data and decrypts the same.
9	Implementation of the link state routing protocols.
10	Implementation of LZW compression and decompression algorithms.

Continuous Assessment Pattern

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

Name of The Course	Software Engineering Lab
Course Code	CSE342
Prerequisite	
Corequisite	
Antirequisite	

			L	T	P	C
			0	0	2	1

Course Objectives:

- Develop complex systems (including analysis, design, construction, maintenance, quality assurance and project management) using the appropriate theory, principles, tools and processes.
- Use appropriate computer science and mathematics principles in the development of software systems.
- Solve problems in a team environment through effective use of written and oral communication skills.
- Have knowledge of current issues presently involved in effectively performing duties as a software practitioner in an ethical and professional manner for the benefit of society.
- Practice the lifelong learning needed in order to keep current as new issues emerge.
- Develop software in at least one application domain.

Course Outcomes:

CO1	Understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry.
CO2	Discuss the distinctions between validation testing and defect testing.
CO3	Understand the principles and need for various types of testing.
CO4	Describe strategies for generating system test cases.
CO5	Understand the essential characteristics of tool used for test automation.

Text Book(s) Reference Book (s)

1. S. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.

2. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
3. Naik and Tripathy, "Software Testing and Quality Assurance", Wiley
4. K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publication.

Title of Lab Experiments	
1.	Demonstration on Manual testing a. Write Programs in „C" Language to demonstrate the working of thefollowing constructs: i)do…while ii) while…do iii)if…else iv)switch v)for b. Write a program in "C" language to demonstrate the working of palindrome using do…while.
2.	Demonstration on Unit testing a. Create a test plan document for any application (e.g. Library Management System). b. Study of any testing tool (e.g. Win runner). c. Create a test plan document for cellular phone.
3.	Demonstration on Integration testing Take a mini project (e.g. University admission, Placement Portal) and execute it. Duri cycle of the mini project create the various testing documents and final test report document.
4.	Demonstration on System testing a. Take any system (e.g. ATM system) and study its system specifications and report the various bugs. b. Write down the test cases for any known applications (e.g. Banking Application).
5.	Demonstration on Blackbox testing a. Design a usecase diagram for an ATM system. b. Design a class diagram for an ATM system. c. Design a usecase diagram for Library system.
6.	Demonstration on WhiteBox testing a. Create various testing document for robot control system. b. "A Program written in „C" Language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure. c. Write a Program in „C" Language to demonstrate the working of Addition of diagonal elements in a matrix.

7.	Demonstration on Regression testing
	a. Study of any web-testing tool (eg. Selenium).
	b. Study of any bug-tracking tool (eg. Bugzilla, bug bit).
	c. Study of any test management tool (eg. Test Director).
	d. Compare different testing tools.
8	Demonstration on Mutation testing
	Write down the test cases for any known applications (e.g. Banking Application).
9	Demonstration on Alpha testing. Make a Case Based study on the experiment
10.	Demonstration on Beta testing. Make a Case Based study on the experiment
11.	Demonstration on User Acceptance testing. Make a Case Based study on the experiment

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
5 0		50	100

Name of The Course	English Proficiency and Aptitude Building -4				
Course Code	LLL312				
Prerequisite					
Corequisite					
Antirequisite					
24 sessions of 100 minutes each, 12 hours of online tests		**L**	**T**	**P**	**C**
		0	0	4	2

Course Objectives:

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

Course Outcomes

CO1	Able to develop a logical thought process related to every aspect of life
CO2	Able to widen the horizon of one's thought process and data analysis skill
CO3	Able to interpret data and convert it into information

Text Book (s)

SLLL own text book

Reference Book (s):

- Communication Skills for Engineers, Mishra,Sunita&C.Muralikrishna,,Pearson
- CorporateSoftskills,SarveshGulati,2006.
- Effective Communication, JohnAdair,MacmillanLtd.1997.
- Developing Communication Skills, Krishna Mohanand Meera Bannerji, Macmillan India Ltd.1990

Continuous Assessment Pattern

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

CSE321	**Data Mining & Data Warehousing**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE202				
Objectives:	Provide a solid introduction to the topic of Data Warehousing. • Show the difference between database and data warehousing. • Introduce the ETL Model. • Use the Star Schema to design a Data Warehouse.				
Expected Outcome:	After completing this course, the student should demonstrate theknowledge and ability to: • Design a data warehouse or data mart to present informationneeded by • management in a form that is usable for management clients. • Implement a high quality data warehouse or data mart. • Effectively administer a corporate data resource in such a waythat it will trulymeet management's needs. • Evaluate standards and new technologies to determine their potential impact onyour information resource.				
Module I					

Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, 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 35
Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchygeneration

Module II		

Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisions, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining,mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Associationrules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases

Module III		

Classification and Predictions: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbor classifiers, Genetic Algorithm.Cluster Analysis:Data types in cluster analysis, Categories of clustering methods, Partitioning methods.Hierarchical Clustering- CURE and Chameleon, Density Based Methods-DBSCAN, OPTICS,Grid Based Methods- STING, CLIQUE, Model Based Method – Statistical Approach, Neural Network approach, Outlier Analysis		
Module IV		
Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes,Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.		
Module V		
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.		

References:
1. M.H.Dunham,”Data Mining:Introductory and Advanced Topics” PearsonEducation
2. Jiawei Han, Micheline Kamber, ”Data Mining Concepts & Techniques” Elsevier
3. Sam Anahory, Dennis Murray, “Data Warehousing in the Real World : A PracticalGuide for Building Decision Support Systems, Pearson Education
4. Mallach,”Data Warehousing System”,McGraw –Hill

Name of The Course	Microprocessor & Interfacing				
Course Code	CSE220				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

1. To Familiarize the students with the architecture of 8086
2. To introduce the concepts of Assembly language programming of 8086.
3. 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 andMaximum 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 sortingprograms, 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.	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Mar ks
2 0	3 0	50	100

CSE323	**Computer Graphics**	3	0	0	3

Version No.	1.0
Prerequisite	CSE101
Objectives:	This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends. A thorough introduction to computer graphics techniques, focusing on 3D modeling, image synthesis, and rendering. Topics cover: geometric transformations, geometric algorithms, software systems (OpenGL), 3D object models (surface, volume and implicit), visible surface algorithms, image synthesis, shading and mapping, ray tracing, radiosity, global illumination, photon mapping, and anti-aliasing. The interdisciplinary nature of computer graphics is emphasized in the wide variety of examples and applications.
Expected Outcome:	to develop a facility with the relevant mathematics of computer graphics, e.g.,3D rotations using both vector algebra and quaternions, andtransformations and projections using homogeneous coordinations.to learn the principles and commonly used paradigms and techniques of computer graphics, e.g.,the graphics pipeline, andBresenham algorithm for speedy line and circle generation.
Module I	**Introduction and Line Generation:**	

Types of computer graphics, Graphic Displays- Random scandisplays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawingalgorithms,
Circle generating algorithms, Mid point circle generating algorithm, and parallelversion of these algorithms.

Module II	**Transformations:**	

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 Barskyalgorithm, Line clipping against non rectangular clip windows; Polygon
clipping – SutherlandHodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Textclipping.

Module III	**Three Dimensional:**	

3-D geometric primitives, 3-D Object representation, 3-D Transformation,3-D viewing, projections, 3-D Clipping.

Module IV	**Curves and Surfaces:**	

Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductoryconcepts of Spline, Bspline and Bezier curves and surfaces.

Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A-buffermethod, 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.

References	

1. Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education
2. Amrendra N Sinha and Arun D Udai," Computer Graphics", TMH16
3. Donald Hearn and M Pauline Baker, "Computer Graphics with OpenGL", Pearsoneducation
4. Steven Harrington, "Computer Graphics: A Programming Approach" , TMH

5. Rogers, " Procedural Elements of Computer Graphics", McGraw Hill

CSE411	**Software Testing Methodologies**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE208				
Objectives:	1. Introducing the various design approaches, models and metrics. 2. Presenting the various techniques and strategies of software testing and inspection and pointing out the importance of testing in achieving high-quality software. 3. Discussing the concept of reliability, the role it plays in software engineering, and how it is modeled and measured. 4. Showing how the software product and process are managed and controlled for maintaining software quality assurance. 5. Highlighting the importance of software maintenance, restructuring, and reengineering. 6. Presenting the various techniques of software cost estimation and risk assessment.				
Expected Outcome:	Upon completion of this course, the student should be able to 1. Use the appropriate methods and tools for estimating software cost. 2. Identify the difference between different software design models and techniques and how to apply them. 3. Recognize the importance of software reliability and how we can design dependable software, and what measures are used. 4. Understand the principles and techniques underlying the process of inspecting and testing software and making it free of errors and tolerable. 5. Recognize the importance of software standards and quality assurance. 6. Apply the appropriate software evolution methods for maintaining, restructuring available software and managing software development.				
Module I	**Introduction**				

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.

Module II	**White Box and Black Box Testing**		

White box testing, static testing, static analysis tools, Structural testing: Module/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

Module III	**Integration, System, and Acceptance Testing**		

Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing,

Design/Architecture verification,Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing,Acceptance testing: Acceptance criteria, test cases selection and execution,

Module IV	Test Selection & Minimization for Regression Testing	

Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

Module V	Test Management and Automation	

Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements fortest tool framework, Test tool selection, Testing in Object Oriented Systems.

References:
1. S. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.
2. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
3. Naik and Tripathy, "Software Testing and Quality Assurance", Wiley
4. K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publication.

EMP133	**Advanced Java Programming**	0	0	2	1

Version No.	1.0

Prerequisite	CSE205

Objectives:	_ Understand practicalities and contexts that call for imperative style programming based on side e_ects instead of functional programming. _ Evaluate variable scopes, memory management, and reference versus value types in relation to parameters and arguments in function calls. _ Understand key merits of object oriented programming in comparison with alternative orientations and class design principles. _ Undestand principles of combining sub-classing and interfaces in designing class hierarchies. _ Understand motivations for literate programming, self documentation, good coding style practices in program design and testing.

Expected Outcome:	On successful completion of the course students should be able to: _ Implement calculation and visualization tasks in imperative style programming and using strictly typed lan-guages. _ Demonstrate informed use static and non-static scopes in programs and classes. _ Describe reference types and value types and demonstrate their use in programming problems. _ Demonstrate best practices in designing classes and class hierarchies from problem statements using sub-classing, abstract classes, and interfaces to achieve polymorphism in object oriented software. Describe con-sequences of the lack or presence of multiple inheritence for their design. _ Demonstrate informed use of encapsulation within and across software components and packages. _ Apply exception handling, generation and escalation mechanisms and practices in writing Java programs. _ Apply self, mutual, or circular references to satisfy data representation in problems and construct mutable data structures. _ Practice self documentation and consistent coding style in writing programs.

Module I	**Introduction:**	

The meaning of Object Orientation, object identity, Encapsulation, informationhiding, polymorphism, generosity, importance of modeling, principles of modeling, objectoriented modeling, Introduction to UML, conceptual model of the UML, Architecture.

Module II	**Basic Structural Modeling:**	

Classes, Relationships, common Mechanisms, and diagrams. Class&Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaborationDiagrams, iterated messages, use of self in messages. Sequence Diagrams: Terms, concepts,depicting asynchronous messages with/without priority, callback mechanism, broadcastmessages. Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams, State Machine ,Process and thread, Event and signals, Time diagram, interaction diagram, Package diagram.Architectural Modeling: Component, Deployment, Component diagrams and Deploymentdiagrams.

Module III	Object Oriented Analysis & Design	

Object Oriented Analysis, Object oriented design, Object design, Combining three models,Designing algorithms, design optimization, Implementation of control, Adjustment ofinheritance, Object representation, Physical packaging, Documenting design considerations.Structured analysis and structured design (SA/SD), Jackson Structured Development (JSD).Mapping object oriented concepts using non-objeile ct oriented language, Translating classes intodata structures, Passing arguments to methods, Implementing inheritance, associations encapsulation. Object oriented programming style: reusability, extensibility, robustness, programming in the large. Procedural v/s OOP, Object oriented language features. Abstraction and Encapsulation.

Module IV	Introduction to Java	

History, Features, Object Oriented concept of Java, Classes and Objects,Inheritance, Packages, Interface , abstract method and classes, Polymorphism, Inner classes,String Handling, I/O , Networking, Event Handling. Multi threading, Collection, Java APIs,Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection,Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, EntityBeans, Introduction to Enterprise Java beans (EJB).

Module V	Advanced Java	

Java Swing: Introduction to AWT, AWT v/s Swing, Creating a Swing Applet and Application.Utility of Java as internet programming language, JDBC, The connectivity model, JDBC/ODBCBridge, Introduction to servlets.

References	

1. James Rumbaugh et. al, "Object Oriented Modeling and Design", PHI
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language UserGuide", Pearson Education
3. Naughton, Schildt, "The Complete Reference JAVA2", TMH
4. Mark Priestley "Practical Object-Oriented Design with UML", TMH
5. Booch, Maksimchuk, Engle, Young, Conallen and Houstan, "Object Oriented Analysisand Design with Applicile ations", Pearson Education
6. Pandey, Tiwari, " Object Oriented Programming with JAVA" , Acme Learning

Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination

Recommended by the Board of Studies on:

Date of Approval by the Academic Council:

Name of The Course	MongoDB			
Course Code	EMP134			
Prerequisite	CSE312			
Co-requisite				
Anti-requisite				
		T	**P**	**C**
		3	0 0	3

Course Objectives

This course provides practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including spark and MongoDB and its ecosystem.

Course Outcomes

CO1	Learn tips and tricks for Big Data use cases and solutions.
CO2	Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop and spark.
CO3	Able to apply MongoDB ecosystem components.
CO4	Learn to build and maintain reliable, for Big Data Analytics using Spark.
CO5	Learn to build and maintain reliable, scalable, distributed systems with MongoDB.

Text Book (s)

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.

2. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press,2014.

Reference Book (s)

1. Chris Eaton, Dirk derooset al. , "Understanding Big data ", McGraw Hill, 2012.

2. Tom White, "HADOOP: The definitive Guide" , O Reilly 2012. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.

3.   Vignesh Prajapati, "Big Data Analytics with R and Haoop", Packet Publishing 2013.

4.   http://www.bigdatauniversity.com/

5.   Jy Liebowitz, "Big Data and Business analytics",CRC press, 2013

Course Contents:

Unit I: **Introduction to Big Data**	8 lecture hours
Introduction of Big Data, Big Data- Four Vs,Advantages of Big Data, Big Data Architecture & Patterns, Big Data: Ingestion, Storage, Data Quality, Data Operations, Data Scalability and Security, Big Data Analytics Big Data Applications-Industry Examples	
Unit II: Working With Data Models	8 lecture hours
Static and Streaming data, Data Models and Data Formats, Data Stream: Definition and application, Data lakes: Definition and application, Exploring streaming sensor data, Exploring streaming twitter data, DBMS and non DBMS approaches to Big Data, From DBMS to BDMS	
Unit III: Introduction to Hadoop Architecture	8 lecture hours
Big Data – Apache Hadoop & Hadoop EcoSystem, Overview of HDFS, Comparison with traditional Databases, Understanding MapReduce- Map and Reduce, Hive and HBase	
Unit IV: Big Data Analytics using Spark	8 lecture hours
Introduction to Apache Spark, Programming In Spark using RDDs in Pipelines, Transformations, Actions, Spark SQL, Spark Streaming, Spark MLLib, Spark GraphX, Discussion; The Spark Ecosystem, Configuring VirtualBox for Spark Streaming, Analyzing Sensor Data with Spark Streaming	
Unit V: Putting MongoDB and Spark to Work	8 lecture hours
Understanding NoSQL- advantages of NoSQL, SQL vs NoSQL, Types of NoSQL, MongoDB,Word Count in Spark, Discussion on word count in spark, Analyze tweets of a domain, Expressing Analytical Questions as MongoDB Queries, Exporting Data from MongoDB to a CSV File.	

CSE361	**Data Compression**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE203				
Objectives:	To gain a fundamental understanding of data compression methods for text,images, and video, and related issues in the storage, access, and use of large data sets. ALso, experience with reading and presenting technical papers.				
Expected Outcome :	• Ability to analyze compression algorithms and compare performance on large inputs. • Programming experience. • Experience with reading technical papers. • Ability to explain and present technical ideas and algorithms to others.				
Module I	**Compression Techniques:**				
Loss less compression, Lossy Compression, Measures of prefonnance,Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.					
Module II	**The Huffman coding algorithm:**				
Minimum variance Huffman codes, Adaptive Huffman coding:Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes,Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.					
Module III	**Coding**				
Coding a sequence, Generating a binary code, Comparison of Binary and Huffman cding,Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary.The LZ77 Approach, The LZ78 Approach, Applications: File					
Compression-UNIX compress,Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Moveto- front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression.					
Module IV	Scalar Quantization				
Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantizer,Adaptive Quantization, Non uniform Quantization.					
Module V	Vector Quantization				
Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-GrayAlgorithm,					

References:
1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers

CSE360	**Artificial Intelligence**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE201, CSE309				
Objectives:	students should possess a firm grounding in the existing techniques and component areas of Artificial Intelligence and be able to apply this knowledge to the development of Intelligent Systems or to the exploration of research problems.				
Expected Outcome:	Upon completion of this subject students are expected to: • Understand the principles of problem solving and be able to apply them successfully. • Be familiar with techniques for computer-based representation and manipulation of complex information, knowledge, and uncertainty. • Gain awareness of several advanced AI applications and topics such as intelligent agents, planning and scheduling, machine learning, etc.				
Module I	**Introduction :**				

Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Module II	**Introduction to Search :**	

Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Module III	**Knowledge Representation & Reasoning:**	

Propositional logic, Theory of first order logic,Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Module IV	**Machine Learning :**	

Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning,

Module V	**Pattern Recognition :**

CSE362	Soft Computing	**3**	**0**	**0**	**3**

Version No.	1.0
Prerequisite	
Course Description:	In this course, the concepts of Neural Networks, Genetic Algorithm andFuzzy systems are discussed.
Expected Outcome:	On completion of this course, the students will be able to 7. Understand the principle of Neural Networks. 8. Discuss the concepts of Genetic Algorithm. 9. Have knowledge on Fuzzy systems.
Unit I	**Artificial Neural Networks**	
Basic-concepts-single layer perception-Multi layer perception-Supervised and un supervised learning back propagation networks, Application		
Unit II	**Fuzzy Systems**	
Fuzzy sets and Fuzzy reasoning-Fuzzzy matrices-Fuzzy functions-decomposition-Fuzzy automata and languages- Fuzzy control methods-Fuzzy decision making, Applications		
Unit III	**Neuro-Fuzzy Modelling**	
Adaptive networks based Fuzzy interfaces-Classification and Rpresentation trees-Datadustemp algorithm –Rule base structure identification-Neuro-Fuzzy controls		
Unit IV	**Genetic Algorithm**	
Survival of the fittest-pictures computations-cross overmutation-reproduction-rank method-rank spacemethod, Application		
Unit V	**Artificial Intelligence**	
AI Search algorithm-Predicate calculus rules of interface - Semantic networks-frames-objects-Hybrid models, applications		
Text Books		
1.Jang J.S.R.,Sun C.T and Mizutami E - Neuro Fuzzy and Soft computing Prentice hall New Jersey,1998 2. Timothy J.Ross:Fuzzy Logic Engineering Applications.McGraw Hill,NewYork,1997. 3. Laurene Fauseett:Fundamentals of Neural Networks.prentice Hall India,New Delhi,1994.		
References:		
1.George J.Klir and Bo Yuan,Fuzzy Sets and Fuzzy Logic,Prentice Hall Inc.,NewJersey,1995 2. Nih.J.Ndssen Artificial Intelligence,Harcourt Asia Ltd.,Singapore,1998.		

Mode of Evaluation	Tests / Quiz / Assignment / Term End Exam / Lab Exam
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

CSE374	**Software Project Management**	3	0	0	3
Version No.	1.0				
Prerequisite	CSE208				
Objectives:	1. Define and highlight importance of software project management. 2. Describe the software project management activities 3.Train software project managers and other individuals involved in software project				

	planning and tracking and oversight in the implementation of the softwareproject management process
Expected Outcome:	At the end of the course, the student shall be able to: 1.Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project. 2. Compare and differentiate organisation structures and project structures. 3.Implement a project to manage project schedule, expenses and resources with the application ofsuitable project management tools.
Module I	**Introduction and Software Project Planning**	
Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scopedocument, Project Management Cycle, SPM Objectives, Management Spectrum, SPMFramework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan,Structure of a Software Project Management Plan, Software project estimation, Estimationmethods, Estimation models, Decision process.		
Module II	**Project Organization and Scheduling**	
Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities andTasks, 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**	
Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators:23Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV),Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of EarnedValue Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks,Walkthroughs, Code Reviews, Pair Programming.		
Module IV	**Software Quality Assurance and Testing**	

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels ofTesting, Test Strategies, Program Correctness, Program Verification & validation, TestingAutomation & Testing Tools, Concept of Software Quality, Software Quality Attributes,Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQAActivities, Formal SQA Approaches: Proof of correctness, Statistical qualityassurance,Cleanroom process.	
Module V	**Project Management and Project Management Tools**
Software Configuration Management: Software Configuration Items and tasks, Baselines, Planfor Change, Change Control, Change Requests Management, Version Control, RiskManagement: Risks and risk types, Risk Breakdown Structure (RBS), Risk ManagementProcess: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost BenefitAnalysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools,MS-Project.	

References:
1. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
2. Royce, Software Project Management, Pearson Education
3. Kieron Conway, Software Project Management, Dreamtech Press
4. S. A. Kelkar, Software Project Management, PHI Publication.

			L	T	P	C
CSE420	BIG DATA ANALYTICS		3	0	0	3
Version No.						
Prerequisite						
Objectives:						

Module I	**Big Data Modeling**	

Introduction of Big Data, Big Data: Ingestion, Storage, Data Quality, Data Operations, Data Scalability and Security, Big Data Design Criteria, Introduction to Data Models, Data Models: Structure, Operations and Constraints, Exploring different Data Models

Module II	**Working With Data Models**	

Static and Streaming data, Data Models and Data Formats, Data Stream: Definition and application, Data lakes: Definition and application, Exploring streaming sensor data, Exploring streaming twitter data, DBMS and non DBMS approaches to Big Data, From DBMS to BDMS, Redis: An Enhanced Key-Value Store, Aerospike: a New Generation KV Store, Semistructured Data – AsterixDB, Solr: Managing Text,Relational Data – Vertica

Module III	**Big Data Integration and Processing**	

Why Big Data Processing is Different, Various aspects of data retrieval and relational querying: What is data retrieval, Querying relational data with postgres, data retrieval for NoSQL data, data aggregation and working with data frames, how to use Pandas to retrieve data from them, Big Data Processing Pipelines: Aggregation and analytical operations, Big Data processing systems, Big Data workflow management, Big Data integration and Processing layer

Module IV	**Big Data Analytics using Spark**	

Introduction to Apache Spark, Programming In Spark using RDDs in Pipelines, Transformations, Actions, Spark SQL, Spark Streaming, Spark MLLib, Spark GraphX, Discussion; The Spark Ecosystem, Configuring VirtualBox for Spark Streaming, Analyzing Sensor Data with Spark Streaming

Module V	**Putting MongoDB and Spark to Work**	

Word Count in Spark, Discussion on word count in spark, Analyze tweets of a domain, Expressing Analytical Questions as MongoDB Queries, Exporting Data from MongoDB to a CSV File.

Name of The Course	INTRODUCTION TO CLOUD COMPUTING				
Course Code	CSE461				
Prerequisite					
Co requisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

To understand the concepts of cloud computing technologies. To gain expertise in server, network and storage cloud.· To understand and deploy practical cloud solutions and enterprise solutions· To gain knowledge on the concept of virtualization that is fundamental to cloud computing· To understand the various issues in cloud computing· To be able to set up a private cloud· To understand the security issues in the grid and the cloud environment·

Course Outcomes

CO1	Identify the architecture, infrastructure and delivery models of cloud computing
CO2	Understand advanced and emerging cloud computing technologies
CO3	Obtain skills to do advanced Cloud Platform Architecture
CO4	Develop services using Cloud computing

Text Book (s)

1	Nick Antonopoulos, Cloud computing, Springer Publications, 2010
2	Humble Devassy,"Mastering KVM Virtualization",Kindle edition, ISBN-13: 9781784396916,2016
3	Enterprise Cloud Computing by GautamShroff, Cambridge,2010

Reference Book (s)

1	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012
2	John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010
3	Tom White, "Hadoop: The Definitive Guide", Yahoo Press, 2012
4	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", McGraw-Hill Osborne Media, 2009.
5	Tim Mather, Subra Kumaraswamy, and Shahed Latif ,"Cloud Security and Privacy", O'Reilly Media, Inc.,2009
6	https://www.amazon.com/Value-Virtualization-Cloud-Computing-accelerate/dp/1492198331 Data centres and cloud computing: https://www.youtube.com/watch?v=_fGrYN5rxhs

Course Contents:

Unit I: Introduction	8 hours
Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.	
Unit II: Trends and Technologies Development	**8 hours**

Introduction about recent development in cloud, trends and technologies innovations in cloud,discuss about IBM cloud, AWS cloud, Microsoft cloud, etc, and explore the future of cloud computing, use of cloud computing technologies in various fields	
Unit III : Cloud Platform Architecture	**9 Hours**

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software- A Generic Cloud Architecture Design – Layered cloud Architectural Development – Virtualization Support and Disaster Recovery – Architectural Design Challenges

Unit IV : Programming Model   **9 Hours**

Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Developing Map ReduceApplications - Design of Hadoop file system –Setting up Hadoop Cluster - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Nimbus

Unit V : Cloud Security   **9 Hours**

Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud - Key privacy issues in the cloud –CloudSecurity and Trust Management

Name of The Course	SOFTWARE TESTING METHODOLOGIES LAB			
Course Code	CSE451			
Prerequisite				
Corequisite				
Antirequisite				
		L	T	P	C
		0	0	2	1

Course Objectives:

Course Outcomes

CO1	Understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry.
CO2	Discuss the distinctions between validation testing and defect testing.
CO3	Understand the principles and need for various types of testing.
CO4	Describe strategies for generating system test cases.
CO5	Understand the essential characteristics of tool used for test automation.

Text

Book(s)

Reference

Book s)

1. S. Desikan and G. Ramesh, "Software Testing: Principles and Practices", PearsonEducation.
2. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
3. Naik and Tripathy, "Software Testing and Quality Assurance", Wiley
4. K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International

Publication.

Sr. No.	Title of Lab Experiments
1.	Demonstration on Manual testing a. Write Programs in „C" Language to demonstrate the working of the followingconstructs: i)do…while ii) while…do iii)if…else iv)switch v)for b. Write a program in "C" language to demonstrate the working of palindrome using do…while.
2.	Demonstration on Unit testing a. Create a test plan document for any application (e.g. Library Management System). b. Study of any testing tool (e.g. Win runner). c. Create a test plan document for cellular phone.
3.	Demonstration on Integration testing Take a mini project (e.g. University admission, Placement Portal) and execute it. Duri cycle of the mini project create the various testing documents and final test report docu
4.	Demonstration on System testing a. Take any system (e.g. ATM system) and study its system specifications and report thevarious bugs. b. Write down the test cases for any known applications (e.g. Banking Application).
5.	Demonstration on Blackbox testing a. Design a usecase diagram for an ATM system. b. Design a class diagram for an ATM system. c. Design a usecase diagram for Library system.
6.	Demonstration on WhiteBox testing a.Create various testing document for robot control system. b."A Program written in „C" Language for Matrix Multiplication fails" Introspect thecauses for its failure and write down the possible reasons for its failure. c. Write a Program in „C" Language to demonstrate the working of Addition of diagonalelements in a matrix.

7.	Demonstration on Regression testing
	
	   a. Study of any web-testing tool (eg. Selenium).
	   b. Study of any bug-tracking tool (eg. Bugzilla, bug bit).
	   c. Study of any test management tool (eg. Test Director).
	   d. Compare different testing tools.

8	Demonstration on Mutation testing Write down the test cases for any known applications (e.g. Banking Application).
9	Demonstration on Alpha testing. Make a Case Based study on the experiment
10.	Demonstration on Beta testing. Make a Case Based study on the experiment
11.	Demonstration on User Acceptance testing. Make a Case Based study on the experiment

Continuous Assessment Pattern

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

Name of The Course	Microprocessor & Interfacing Lab			
Course Code	CSE240			
Prerequisite				
Corequisite				
Antirequisite				
		L	**T**	**P**	**C**
		0	**0**	2	1

Course Objectives:

This course facilitates the students to familiar with Micro Processor (MP) based system design which includes hardware, software and interfacing. After completing this course, the student should be able to design a complete Microprocessor based system for a real-world application. Course covers the introduction to basic digital devices and microcomputer components, Architecture and programming of 8086 Microprocessors, Interrupts, peripheral interfacing and direct memory access.

Course Outcomes

CO1	Write assembly language program for basic mathematical and logical operations.
CO2	Explain the interrupts of 8086 microprocessor
CO3	Explain the 8086 based system with programmable peripheral interface, programmable timer interface and Programmable interrupt controller interface.
CO4	Summarize the concept of peripheral / interfacing
CO5	Analyze the 8086 based system with DMA.

Text Book (s)

1	Brey Barry B. & C R Sarma The Intel Microproc,: Arch, Prog. & Interfacing Pearson Edu.,8thEdition, 2008.

Reference Book (s)

1	The x86 processors, Architecture, programming and interfacing. Lyla B Das, Pearson 2010.
2	Morris Mano, Digital Design ,PHI, 5th edition, 2012.

List Of Experiments	
1	Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
2	Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3	By using string operation and Instruction prefix: Move Block, Reverse string, Sorting,
4	Inserting, Deleting, Length of the string, String comparison.
5	Reading and Writing on a parallel port.

6	Timer in different modes.
7	Serial communication implementation.
8	8259 – Interrupt Controller: Generate an interrupt using 8259 timer.
9	8279 – Keyboard Display: Write a small program to display a string of characters.
10	Traffic Controller Interface.
11	ADC & DAC Interface.

12	8255- Interface.
13	8251- UART Interfacing

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
5 0		50	100

LLL 322	**CAMPUS TO CORPORATE**	L	T	P	C
Version 1.0	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of Semester 5				
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

1. To assess the current level of students.
2. To give a real time GD, Interview practice to the students.
3. To prepare students for technical interviews
4. To prepare the students for the placement process and future career prospects

Course Outcomes

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

1. Able to analyze self and make necessary corrections
2. Able to recognize and make use of the strengths
3. Able to structure and express their thoughts during interviews , GD and presentations
4. Able to develop skills for career enhancement

Course Catalogue

Practice makes a man perfect – so says the wise man. The course in this semester hence, focuses on the practice of company sample papers along with mock interviews – general, technical and HR. It aims to give a holistic approach to a student's final preparation.

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

Real world HR interviews from companies across various sectors like IT, ITES, Manufacturing, etc. in and around NCR region.

Name of The Course	Web Technologies

Course Code	CSE412
Prerequisite	
Corequisite	
Antirequisite	

	L	T	P	C
	3	0	0	3

Course Objectives:

Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's. Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

Course Outcomes

CO1	Understand basic web concepts and Internet protocols.
CO2	Understand CGI Concepts & CGI Programming.
CO3	Analyze Scripting Languages.
CO4	Analyze Scripting Languages.
CO5	Design SERVELETS AND JSP.

Text Book (s)

1	IvanBayross -Web Enabled Commercial Application Development Using HTML, DHTML, Java Script, Perl, CGI-2000
2	Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.

3	Paul Dietel and Harvey Deitel,"Java How to Program", Prentice Hall India Learning Private Limited

Reference Book (s)

1	Mahesh P. Matha, "Core Java A Comprehensive study", Prentice Hall of India, 2011.
2	UttamK.Roy, "Web Technologies", Oxford University Press, 2011.

Unit I:	**8 lecture hours**
Introduction to web, protocols governing the web, web development strategies, web applications, web project, web team.	
Unit II:	**8 lecture hours**
HTML: list, table, images, frames, forms, CSS;XML: DTD, XML schemes, presenting andusing XML	
Unit III:	**8 lecture hours**
Java script: Introduction, documents, forms, statements, functions, objects; Event and eventhandling; introduction to AJAX.	
Unit IV:	**8 lecture hours**
Java server pages (JSP), JSP application design, declaring variables and methods, debugging, sharing data between JSP pages, JSP objects, Session, development of java beansin Jsp, data base action with JSP.	
Unit V:	**8 lecture hours**
Unit V: PHP (Hypertext Preprocessor): Introduction, syntax, variables, strings, operators, if- else, loop, switch, array, function, form ,mail, file upload, session, error, exception, filter, PHP-ODBC.	

Continuous Assessment Pattern

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

Name of The Course	Mobile Computing
Course Code	**CSE522**
Prerequisite	
Co-requisite	
Anti-requisite	
	L **T** **P** **C**
	3 **0** **0** **3**

Course Objectives

1. To introduce the basic concepts and principles in mobile computing. This includes the major techniques involved, and networks & systems issues for the design and implementation of mobile computing systems and applications.
2. To explore both theoretical and practical issues of mobile computing.
3. To provide an opportunity for students to understand the key components and technologies involved in building mobile applications.
4. To understand the concept of Wireless LANs, PAN, Mobile Networks.

Course Outcomes

CO1	Grasp the concepts and features of mobile computing technologies andapplications.
CO2	Understand how the underlying wireless and mobile communication networkswork, their technical features, and what kinds of applications they can support.
CO3	Identify the important issues of developing mobile computing systems andapplications.
CO4	Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software

	architectures, and applying standard programming languages and tools.
CO5	Acquire the knowledge to administrate and to maintain a Wireless LAN.

Text Book (s)

1. Jochen, M Schiller, "Mobile Communications, 2nd Edition Pearson Education, India,2009

Reference Book (s)

1. Charles Perkins, Ad hoc Networks, Addison Wesley.
2. Upadhyaya, "Mobile Computing", Springer
3. Kurnkum Garg "Mobile Computing",Pearson 2010

Course Content

Unit I:Introduction	**8 lecture hours**
Introduction of mobile computing, overview of wireless telephony: cellular concept, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, Multiple access techniques like Frequency division multiple access (FDMA), Time division multiple access (TDMA), Code division multiple access (CDMA), Space division multiple access (SDMA).	
Unit II: Wireless Networking	**8 lecture hours**
Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.	
Unit III: Global System for Mobile Communications	**8 lecture hours**
GSM Architecture, GSM Entities ,Call Routing in GSM, GSM Addresses and Identifiers ,Network Aspects in GSM , GSM Frequency Allocation, Authentication and Security, Mobile Computing over SMS, Short Message (SMS) , Value Added Services through, MS, Accessing the SMS Bearer, GPRS and packet Architecture GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS ,Application for GPRS, Limitation of GPRS, Billing and Charging in GPRS, WAP , MMS , GPRS Applications,Spread – Spectrum Technology.	
Unit IV: Data Management	**8 lecture**

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system, disconnected operations. Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit V: Routing Ad Hoc Network & Security Issues   8 lecture hours

Routing Protocols: Ad Hoc Network Routing Protocols, Destination Sequenced DistanceVector Algorithm, Cluster Based Gateway Switch Routing, Dynamic Source Routing, Ad Hoc on-demand Routing, Location Aided Routing, Zonal Routing Algorithm. Mobile Computing Security Issues, Authentication, Encryption, Cryptographic Tools: Hash, Message Authentication Code (MAC), Digital Signature, Certificate. Secure Socket Layer (SSL). Characteristics of SIM, Equipment Identification.

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 Security			
Course Code	CSE401			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

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

Course Contents:

Unit-1: INTRODUCTION	**9 hours**
Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, Steganography.	

Unit II: SYMMETRIC KEY CRYPTOGRAPHY	**9 hours**
Algebraic structures - Modular arithmetic-Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher mode of operation – Advanced Encryption Standard - RC4 – Key distribution.	

Unit III : PUBLIC KEY CRYPTOGRAPHY	**9 Hours**
Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.	

Unit IV : MESSAGE AUTHENTICATION	**9 Hours**

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications – Kerberos.

Unit V : SECURITY PRACTICE	**9 Hours**

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

Name of The Course	Big Data Analytics forIOT				
Course Code	**CSE606**				
Prerequisite					
Co-requisite					
Anti-requisite					
			L		**P**
			3	0	0	3

Course Objectives

This course provides practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic andadvanced methods to big data technology and tools, including spark and MongoDB and its ecosystem.

Course Outcomes

CO1	Learn tips and tricks for Big Data use cases and solutions.

CO2	Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop and spark.
CO3	Able to apply MongoDB ecosystem components.
CO4	Learn to build and maintain reliable, for Big Data Analytics using Spark.
CO5	Learn to build and maintain reliable, scalable, distributed systems with MongoDB.

Text Book (s)

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press,2014.

Reference Book (s)
1. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012.
2. Tom White, "HADOOP: The definitive Guide" , O Reilly 2012. Tom Plunkett, Brian
   Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
3. Vignesh Prajapati, "Big Data Analytics with R and Haoop", Packet Publishing 2013.
4. http://www.bigdatauniversity.com/
5. Jy Liebowitz, "Big Data and Business analytics",CRC press, 2013

Course Contents:

Unit I: Introduction to Big Data	8 lecture hours
Introduction of Big Data, Big Data- Four Vs, Advantages of Big Data, Big Data Architecture & Patterns, Big Data: Ingestion, Storage, Data Quality, Data Operations, Data Scalability and Security, Big Data Analytics Big Data Applications-Industry Examples	

Unit II: Working With Data Models	8 lecture hours
Static and Streaming data, Data Models and Data Formats, Data Stream: Definition and application, Data lakes: Definition and application, Exploring streaming sensor data, Exploring streaming twitter data, DBMS and non DBMS approaches to Big Data, From DBMS to BDMS	

Unit III: Introduction to Hadoop Architecture	8 lecture hours
Big Data – Apache Hadoop & Hadoop EcoSystem, Overview of HDFS, Comparison with traditional Databases, Understanding MapReduce- Map and Reduce, Hive and HBase	

Unit IV: Big Data Analytics using Spark	8 lecture hours
Introduction to Apache Spark, Programming In Spark using RDDs in Pipelines, Transformations, Actions, Spark SQL, Spark Streaming, Spark MLLib, Spark GraphX, Discussion; The Spark Ecosystem, Configuring VirtualBox for Spark Streaming, Analyzing Sensor Data with Spark Streaming	

Unit V: Putting MongoDB and Spark to Work	8 lecture hours

Understanding NoSQL- advantages of NoSQL, SQL vs NoSQL, Types of NoSQL, MongoDB, Word Count in Spark, Discussion on word count in spark, Analyze tweets of a domain, Expressing Analytical Questions as MongoDB Queries, Exporting Data from MongoDB to a CSV File.

Name of The Course	Big Data technology			
Course Code	BCSE9003(PE4)			
Prerequisite				
Co-requisite				
Anti-requisite				
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives

This course provides practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including spark and MongoDB and its ecosystem.

Course Outcomes

CO1	Learn tips and tricks for Big Data use cases and solutions.
CO2	Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop and spark.
CO3	Able to apply MongoDB ecosystem components.
CO4	Learn to build and maintain reliable, for Big Data Analytics using Spark.
CO5	Learn to build and maintain reliable, scalable, distributed systems with MongoDB.

Text Book (s)

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press,2014.

Reference Book (s)

1. Chris Eaton, Dirk derooset al. , "Understanding Big data ", McGraw Hill, 2012.
2. Tom White, "HADOOP: The definitive Guide" , O Reilly 2012. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
3. Vignesh Prajapati, "Big Data Analytics with R and Haoop", Packet Publishing 2013.
4. http://www.bigdatauniversity.com/
5. Jy Liebowitz, "Big Data and Business analytics",CRC press, 2013

Course Contents:

Unit I: **Introduction to Big Data**	**8 lecture hours**

Introduction of Big Data, Big Data- Four Vs,Advantages of Big Data, Big Data Architecture & Patterns, Big Data: Ingestion, Storage, Data Quality, Data Operations, Data Scalability and Security, Big Data Analytics Big Data Applications-Industry Examples

Unit II: **Working With Data Models**	**8 lecture hours**

Static and Streaming data, Data Models and Data Formats, Data Stream: Definition and application, Data lakes: Definition and application, Exploring streaming sensor data, Exploring streaming twitter data, DBMS and non DBMS approaches to Big Data, From DBMS to BDMS

Unit III: **Introduction to Hadoop Architecture**	**8 lecture hours**

Big Data – Apache Hadoop & Hadoop EcoSystem, Overview of HDFS, Comparison with traditional Databases, Understanding MapReduce- Map and Reduce, Hive and HBase

Unit IV: **Big Data Analytics using Spark**	**8 lecture hours**

Introduction to Apache Spark, Programming In Spark using RDDs in Pipelines, Transformations, Actions, Spark SQL, Spark Streaming, Spark MLLib, Spark GraphX, Discussion; The Spark Ecosystem, Configuring VirtualBox for Spark Streaming, Analyzing Sensor Data with Spark Streaming

Unit V: **Putting MongoDB and Spark to Work**	**8 lecture hours**

Understanding NoSQL- advantages of NoSQL, SQL vs NoSQL, Types of NoSQL, MongoDB, Word Count in Spark, Discussion on word count in spark, Analyze tweets of a domain, Expressing Analytical Questions as MongoDB Queries, Exporting Data from MongoDB to a CSV File.

Name of The Course	Introduction of IOT			
Course Code	CSIO 101			
Prerequisite	Theoretical understanding of basic electronics.			
Co requisite	Understand general theoretical concepts of Internet of Things.			
Antirequisite	None			
		L	T	P	C
		2	0	2	2

UNIT - I Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT - II IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT - III Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling. Python packages - JSON, XML, HTTP Lib, URL Lib, SMTP Lib. R16 B.TECH CSE.

UNIT - IV IoT Physical Devices and Endpoints - Introduction to Raspberry PI - Interfaces (serial, SPI, I2C). Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs. Web server – Web server for IoT, Cloud for IoT, Python web application framework. Designing a RESTful web API

Name of The Course	Artificial Intelligence and Intelligent System				
Course Code	BCSE9009				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:
1. Learn and possess a firm grounding in the existing techniques and component areas ofArtificial Intelligence
2. Apply this knowledge to the development of Artficial Intelligent Systems and to theexploration of research problems.

Course Outcomes

CO1	Understand the principles of problem solving and be able to apply themsuccessfully.

CO2	Be familiar with techniques for computer-based representation and manipulation ofcomplex information, knowledge, and uncertainty.
CO3	Gain awareness of several advanced AI applications and topics such as intelligentagents, planning and scheduling, machine learning, etc.

Text Book (s)

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", PearsonEducation.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill

Reference Book (s):

3. E Charniak and D McDermott, "Introduction to Artificial Intelligence", PearsonEducation

4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India,

Course Contents:

Unit I: Introduction	8 lecture hours
Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.	
Module II: Introduction to Search	**8lecture hours**
Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.	
Module III: Knowledge Representation & Reasoning **8lecture hours**	
Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.	
Module IV: Machine Learning	**8 lecture hours**
Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning	
Module V: Pattern Recognition **8 lecture hours**	
Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.	

Continuous Assessment Pattern

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

Name of The Course	Cloud Application Development				
Course Code	BCSE9002				
Prerequisite					
Co requisite					
Antirequisite					
		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 studies 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 oncloud
CO3	Use web application based technologies for developing application using cloud
CO4	Use public cloud like IBM Blue mix, 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

Name of The Course	Programming in Python
Course Code	CSE200
Prerequisite	
Co-requisite	
Anti-requisite	

			L	T	P	C
			0	0	4	2

Course Objectives

To understand the basic Gain knowledge of Basic Programming with Python

Course Outcomes

CO1	Gain knowledge of Basic Programming with Python **(K3)**
CO2	Familiarize with python string handling techniques and user defined functions **(K4)**
CO3	Understand and use data structures like Lists, tuples, and dictionaries **(K3)**
CO4	Understand File handling **(K3)**
CO5	Use object oriented programming techniques **(K3)**

Text Book (s)

5. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
6. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
7. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education
8. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication

Reference Book (s)

3. Downey, Allen B., Think Python: How to Think Like a Computer Scientist. O'Reilly, 2012. Obtain free PDF at http://www.greenteapress.com/thinkpython/
4. Python Programming: An Introduction to Computer Science (Second Edition) John Zelle, ISBN 978-1-59028-241-0-9, Franklin, Beedle & Associates Inc., 2004.

Course Content

Unit I:Introduction	8 Lab hours

History, Features, Working with Python, Installing Python, basic python syntax, interactive shell,
editing, saving, and running a script. Tokens: Keywords, , Identifiers, Literals, Operators, data types; variables, assignments; immutable variables; numerical types; Operators and Boolean expressions.

Debugging, comments in the program; understanding error messages; Built-in functions – type(), id(), eval(), random, chr(), ord();

Unit II: Condition Control Structures & Input Output	8 Lab hours

Conditional Statements: If, If-else, Nested if-else; Loops: For, While, Nested loops; Control Statements: Break, Continue, Pass; Input and output: Taking input from user through keyboard, manipulation of input, formatted input, formatted output.

Unit III:Function and Strings	8 Lab hours

Functions in Python: Defining a function, Calling a function, Types of functions, Function Arguments, Global and local variables. Strings: Single quoted, double quoted & triple quoted, String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa.

Unit IV:Lists, Tuples and Dictionaries	8 Lab hours

Basic List operators, iterating over a list, replacing, inserting, removing an element; searching and sorting lists, calculating the sum and average of items in a list ; Tuples - sequence of values , immutability, Comparing tuples, Tuple assignment: Dictionary- Store data as key-value pairs in dictionaries, search for values, change existing values, add new, key-value pairs, and delete key-value pairs, nesting objects, sorting, dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

Unit V:Files, Regular Expressions& Modules	**8 Lab hours**
Reading/writing text and numbers from/to a file in text files and csv files; Regular expressions, importing and creating modules: Manipulating files and directories using os module.	

Course Code: BCSE9004	Programming for Data Analysis	L	T	P	C
Version No. XXX	Date of Approval: XXX	3	0	0	3
Prerequisite/Exposure	Python, DBMS, Java and C				
Co-requisites					

Course Objectives:
The objective of this course is to:
1. Understanding basic network and distributed programming.
2. Constructing a real world application with data storage and retrieval
3. Leveraging the benefits of reusable components
4. Analyzing basic file modes and operations
5. Applying Map Reduce paradigm to solve problems

Course Outcomes:
At the end of the course students will be able to:
1. Understand network programming.
2. Design and execute queries in database.
3. Use Javabeans in creating applications.
4. Implement streams and memory mapped files.
5. Write mapreduce program in Java.

Catalog Description:

This covers describes the rate in which data is exponentially growing has led to the evolvement of many technologies to better utilize this data for timely and accurate decision making. Such data with huge variety, volume and velocity is coined as big data. The big data platform such as Hadoop is programmed in Java. This course aims at discussing the technical concepts which are the basic building blocks for most of the big data platforms.

Text Books:
1. Y. Daniel Liang, Introduction to Java Programming, Tenth Edition, Pearson, 2015.
2. White, "Hadoop: The Definitive Guide", Third Edition - 2012 – O'Reilly – ISBN: 9789350237564.

Reference Books:
1. Cay S. Horstmann, Gary Cornell, "Core Java™ 2: Volume II–Advanced Features", Prentice Hall, 9th edition, ISBN: 978-0137081608.
2. Jean Dollimore, Tim Kindberg, George Coulouris, "Distributed Systems Concepts and Design", 4th Edition, Jun 2005, Hardback, 944 pages, ISBN: 9780321263544.

Course Content

Unit I: Network Programming & Distributed Objects   **8 lecture hours**
Connecting to a Server-Implementing Servers and Clients-Advanced Socket Programming- InetAddress-URL Connections-RMI Programming.

Unit II: Connecting to Database   **8 lecture hours**

The Design of JDBC-Basic Concepts-Executing Queries–Prepared Statemets-Result Sets– Metadata-Transactions.

Unit III: Javabeans   **8 lecture hours**

The Bean-Writing Process-Using Beans to Build an Application-Bean Property Types-Property Editors-Customizers.

Unit IV: Streams and Files   **8 lecture hours**

Streams-Text Input and Output-Reading and Writing Binary Data-Zip Archives-Object Streams and Serialization-Memory Mapped Files.

Unit V: Programming Map Reduce   **8 lecture hours**

MapReduce program in Java-Map Reduce API-Progamming Examples- Combiner Functions - Distributed MapReduce Job.

Mode of Evaluation: Class Quiz, Assignment and EEP.