Himachal Pradesh Technical University, Hamirpur (H.P.)

CURRICULUM (CBCS)

COMPUTER SCIENCE ENGINEERING

(3^{rd} to 8^{th} Semester)

Teaching and Examination Scheme

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SCHEME OF TEACHING AND EXAMINATION
COMPUTER SCIENCE & ENGINEERING

SEMESTER – III

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		LA Marks	ESE Marks	Total Marks
1	FC	MA-301	Probability and Statistics	2	2	0	3	40	60	100
2	FC	HS – 305	Industrial Economics and Management	3	0	0	3	40	60	100
3	PC	CS-301	Data Structures	3	1	0	4	40	60	100
4	PC	CS-302	Object Oriented Programming using C++	3	1	0	4	40	60	100
5	PC	EC-302	Digital Electronics	3	1	0	4	40	60	100
6	PC	CS-303	Computer Architecture & Organization	3	0	0	3	40	60	100
7	OE	-	Open Elective – I	2	0	0	2	40	60	100
Labs:										
1	PC	CS-311	Data Structures Lab	0	0	2	1	30	20	50
2	PC	CS-312	C++ Programming Lab	0	0	2	1	30	20	50
3	PC	EC-306	Digital Electronics Lab	0	0	2	1	30	20	50
			Total	**19**	**5**	**6**	**24+2**			

OPEN ELECTIVE I

S. N.	Cat.	Subject Code	Title	Teaching Hours Per Week			Credits	Examination		
				L	T	P/D		LA Marks	ESE Marks	Total Marks
1	OE	HS-306	Sociology & Elements of Indian History for Engineers	2	0	0	2	40	60	100
2	OE	HS-307	German Language - I	2	0	0	2	40	60	100
3	OE	HS-308	French Language – I	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION
COMPUTER SCIENCE & ENGINEERING

SEMESTER – IV

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		LA Marks	ESE Marks	Total Marks
1	FC	MA-401	Optimization and Calculus of Variations	2	2	0	3	40	60	100
2	FC	HS-409	Human Values and Professional Ethics	2	2	0	3	40	60	100
3	PC	CS-401	Database Management System	3	0	0	3	40	60	100
4	PC	CS-402	Operating System	3	1	0	4	40	60	100
5	PC	CS-404	Theory of Computation	3	1	0	4	40	60	100
6	PC	EC-402	Microprocessor & Peripherals	3	1	0	4	40	60	100
7	OE	-	Open Elective –II	2	0	0	2	40	60	100
Labs:										
1	PC	CS-411	Database Management System Lab	0	0	2	1	30	20	50
2	PC	EC-405	Microprocessor & Peripherals Lab	0	0	2	1	30	20	50
3	PC	CS-412	Operating System Lab	0	0	2	1	30	20	50
			Total	**18**	**7**	**6**	**24+2**			

OPEN ELECTIVE II

S. N.	Cat.	Subject Code	Title	Teaching Hours Per Week			Credits	Examination		
				L	T	P/D		LA Marks	ESE Marks	Total Marks
1	OE	HS-410	Law for Engineers	2	0	0	2	40	60	100
2	OE	HS-411	German Language - II	2	0	0	2	40	60	100
3	OE	HS-412	French Language – II	2	0	0	2	40	60	100

Industrial Training after IV Semester of four weeks duration.

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SCHEME OF TEACHING AND EXAMINATION B.TECH COMPUTER SCIENCE & ENGINEERING										
SEMESTER – V										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I.A Marks**	**ESE Marks**	**Total Marks**
1	PC	CS-501	Computer Networks	3	1	0	4	40	60	100
2	PC	CS-502	Core Java	3	0	0	3	40	60	100
3	PC	CS-503	Computer Graphics	2	2	0	3	40	60	100
4	PC	CS-504	Artificial Intelligence & Expert System	3	0	0	3	40	60	100
5	PC	CS-505	Software Engineering	3	1	0	4	40	60	100
6	PC	CS-506	Analysis and Design of Algorithm	3	1	0	4	40	60	100
7	OE	-	Open Elective -III	2	0	0	2	40	60	100
Labs:										
1	PC	CS-511	Computer Networks Lab	0	0	2	1	30	20	50
2	PC	CS-512	Core Java Lab	0	0	2	1	30	20	50
3	PC	CS-513	Computer Graphics Lab	0	0	2	1	30	20	50
4	MC	CS-514	Industrial Training (Viva-Voce)	0	0	0	Satisfactory / Unsatisfactory			
			Total	**17+2**	**6**	**4**	**24+2**			

OPEN ELECTIVE – III (FOR STUDENTS OF OTHER DEPARTMENT)										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	OE	CS-507	Basics of Operating Systems	2	0	0	2	40	60	100
2	OE	CS-508	PC Maintenance & Troubleshooting	2	0	0	2	40	60	100
3	OE	IT-501	Management of Information System	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION B.TECH COMPUTER SCIENCE & ENGINEERING										
SEMESTER – VI										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I. A Marks**	**ESE Marks**	**Total Marks**
1	PC	CS-601	Advance Java	3	1	0	4	40	60	100
2	PC	CS-602	Distributed Operating System	3	0	0	3	40	60	100
3	PC	CS-603	Compiler Design	3	1	0	4	40	60	100
4	PC	CS-604	Linux Administration	2	2	0	3	40	60	100
5	PC	CS-605	Data Mining & Data Warehousing	3	1	0	4	40	60	100
6	PC	CS-606	Modeling & Simulation	3	0	0	3	40	60	100
7	PE	-	Programme Elective – I	3	0	0	3	40	60	100
Labs:										
1	PC	CS-611	Advanced Java Lab	0	0	2	1	30	20	50
2	PC	CS-612	Modeling & Simulation Lab	0	0	2	1	30	20	50
3	MC	CS-613	Seminar	0	0	2	1	50	50	100
			Total	**17+3**	**5**	**6**	**24+3**			

PROGRAM ELECTIVE – I										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	PE	IT-601	Management Information Systems	3	0	0	3	40	60	100
2	PE	IT-602	Enterprise Resource Planning	3	0	0	3	40	60	100
3	PE	IT-603	Multimedia Technology	3	0	0	3	40	60	100

Industrial Training after VI Semester of six weeks duration

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SCHEME OF TEACHING AND EXAMINATION B.TECH: COMPUTER SCIENCE & ENGINEERING										
SEMESTER – VII										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I. A Marks**	**ESE Marks**	**Total Marks**
1	PC	CS-701	Advance Computer Architecture	3	1	0	4	40	60	100
2	PC	CS-702	Wireless & Mobile Computing	2	2	0	3	40	60	100
3	PC	CS-703	Information Security	3	1	0	4	40	60	100
4	PC	CS-704	Cloud Computing	3	1	0	4	40	60	100
5.	PE		Programme Elective-II	3	0	0	3	40	60	100
Labs:										
1	PC	CS-711	Cloud Computing Lab	0	0	2	1	30	20	50
2	MC	CS-712	Project Work - I	0	0	4	2	50	50	100
3	PC	CS-713	Industrial Training (Viva-Voce)	0	0	0	2	50	50	100
			Total	**11+3**	**5**	**6**	**20+3**			

PROGRAM ELECTIVE – II										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	PE	IT-701	Big Data Analytics	3	0	0	3	40	60	100
2	PE	CS-705	Embedded Systems	3	0	0	3	40	60	100
3	PE	CS-706	Web Technology	3	0	0	3	40	60	100

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SCHEME OF TEACHING AND EXAMINATION B.TECH COMPUTER SCIENCE & ENGINEERING										
SEMESTER – VIII										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I. A Marks**	**ESE Marks**	**Total Marks**
1	PE		Programme Elective - III	3	0	0	3	40	60	100
2	PE		Programme Elective - IV	3	0	0	3	40	60	100
3	MC	CS-804	Project Work - II	0	0	16	8	50	50	100
			Total	**6**	**0**	**16**	**8 + 6**			
OR										
4	MC	CS-811	Industrial Project	0	0	16	8	50	50	100
			Total	**0**	**0**	**16**	**8**			

PROGRAM ELECTIVE – III										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	PE	CS-801	Mobile Adhoc & Sensor Networks	3	0	0	3	40	60	100
2	PE	CS-802	Distributed Systems	3	0	0	3	40	60	100
3	PE	CS-803	Soft Computing	3	0	0	3	40	60	100

PROGRAM ELECTIVE – IV										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	PE	IT-801	Mobile Application Development	3	0	0	3	40	60	100
2	PE	IT-802	Natural Language Processing	3	0	0	3	40	60	100
3	PE	IT-803	Cyber Security & Cyber Laws	3	0	0	3	40	60	100

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Note: Industrial Project of Four months duration is to be carried out by the student exclusively in industry under the joint supervision of faculty advisers from institution as well as from the industry.

Categorization of Subjects in CSE Department

	S. No.	Semester	Category	Paper Code	Subject	Credits	Implementation
Foundation Courses	1	1	FC	MA-101	Engineering Math –I	4	Student have to study all FC Courses
	2	1	FC	PH-101	Engineering Physics	4	
	3	1	FC	ME-101	Engineering Mechanics	3	
	4	1	FC	CS -101	Computer Fundamentals and Programming in C++	3	
	5	1	FC	PH-111	Engineering Physics Lab	1	
	6	1	FC	CS -111	Computer Programming Lab	1	
	7	2	FC	CH -101	Engineering Chemistry	4	
	8	2	FC	EE -101	Principles of Electrical Engg.	3	
	9	2	FC	EC -101	Fundamentals of Electronics Engg.	3	
	10	2	FC	EE- 111	Electrical Engg. Lab	1	
	11	2	FC	CH-111	Engineering Chemisty Lab	1	
	12	2	FC	EC- 111	Electronics Engg. Lab	1	
	13	2	FC	MA -202	Engineering Math –II	4	
	14	3	FC	MA-301	Probability and Statistics	3	
	15	3	FC	HS – 305	Industrial Economics and Management	3	
	16	4	FC	MA-401	Optimization and Calculus of Variations	3	
	17	4	FC	HS-409	Human Values and Professional Ethics	3	
	Total					**45**	**45**
Mandatory Courses	1	1	MC	HS-101	English Communication Skills	2	Student have to study all MC Courses but either Project II or Industrial Project so 34-8=26
	2	1	MC	ME-102	Engineering Drawing & Graphics	3	
	3	1	MC	HS-102	Environmental Science	2	
	4	1	MC	HS -111	Communication Lab	1	
	5	2	MC	ME -103	Workshop Technology	3	
	6	2	MC	HS- 103	Disaster Management	2	
	7	2	MC	HS -204	Business Communication	2	
	8	5	MC	CS-514	Industrial Training (Viva - Voce)	0	
	9	6	MC	CS-613	Seminar	1	
	10	7	MC	CS-712	Project Work -I	2	
	11	8	MC	CS-804	Project Work - II	8	
	12	8	MC	CS-811	Industrial Project	8	
	Total					**34**	**26**
Open Electives	1	3	OE		Open Elective – I	2	Student have to study any 1 OE Courses
	2	4	OE		Open Elective –II	2	
	3	5	OE		Open Elective -III	2	
	Total					**6**	**2**

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Program Core	1	3	PC	CS-301	Data Structures	4	Student have to study all PC Courses
	2	3	PC	CS-302	Object Oriented Programming using C++	4	
	3	3	PC	EC-302	Digital Electronics	4	
	4	3	PC	CS-303	Computer Architecture & Organization	3	
	5	3	PC	CS-311	Data Structures Lab	1	
	6	3	PC	CS-312	C++ Programming Lab	1	
	7	3	PC	EC-306	Digital Electronics Lab	1	
	8	4	PC	CS-401	Database Management System	3	
	9	4	PC	CS-402	Operating System	4	
	10	4	PC	CS-404	Theory of Computation	4	
	11	4	PC	EC-402	Microprocessor & Peripherals	4	
	12	4	PC	CS-411	Database Management System Lab	1	
	13	4	PC	EC-405	Microprocessor & Peripherals Lab	1	
	14	4	PC	CS-412	Operating System Lab	1	
	15	5	PC	CS-501	Computer Networks	4	
	16	5	PC	CS-502	Core Java	3	
	17	5	PC	CS-503	Computer Graphics	3	
	18	5	PC	CS-504	Artificial Intelligence & Expert Systems	3	
	19	5	PC	CS-505	Software Engineering	4	
	20	5	PC	CS-506	Analysis and Design of Algorithm	4	
	21	5	PC	CS-511	Computer Networks Lab	1	
	22	5	PC	CS-512	Core Java Lab	1	
	23	5	PC	CS-513	Computer Graphics Lab	1	
	24	6	PC	CS-601	Advanced Java	4	
	25	6	PC	CS-602	Distributed Operating System	3	
	26	6	PC	CS-603	Compiler Design	4	
	27	6	PC	CS-604	Linux Administration	3	
	28	6	PC	CS-605	Data Mining & Data Warehousing	4	
	29	6	PC	CS-606	Modelling & Simulation	3	
	30	6	PC	CS-611	Advanced Java Lab	1	
	31	6	PC	CS-612	Modeling & Simulation Lab	1	
	32	7	PC	CS-701	Advance Computer Architecture	4	
	33	7	PC	CS-702	Wireless & Mobile Computing	3	
	34	7	PC	CS-703	Information Security	4	
	35	7	PC	CS-704	Cloud Computing	4	
	36	7	PC	CS-713	Industrial /Practical Training(Viva-Voce)	2	
	37	7	PC	CS-711	Cloud Computing Lab	1	
	Total					**101**	**101**
Program Electives	1	6	PE		Programme Elective – I	3	Student have to study any 2 PE Courses
	2	7	PE		Programme Elective-II	3	
	3	8	PE		Programme Elective - III	3	
	4	8	PE		Programme Elective - IV	3	
	Total					**12**	**6**
					Total Credits	**198**	**180**

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MA 301: PROBABILITY AND STATISTICS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Probability and Random Variables:** introduction, basic concepts–sample space, events, counting sample space, conditional probability and independence, permutations and combinations, rules of probability, bayes' theorem. random variables – concept of random variable, percentiles, probability distributions – discrete & continuous, mean, variance and covariance of random variables, chebychev's inequality.	6
II	**Standard Probability Distributions:** Discrete distributions - uniform, binomial, multinomial, hyper geometric, poisson, negative binomial, poission; continuous distributions - normal, exponential, gamma, weibull and beta distributions and their properties -function of random variables.	6
III	**Sampling Distributions:** Random sampling, sampling distributions of means, estimation, properties of point estimators, confidence interval, maximum likelihood and bayes estimators, prediction intervals.	6
IV	**Testing of Hypothesis:** Sampling distributions – testing of hypothesis for mean, variance, proportions and differences using normal, t, Chi-square and F distributions, tests for independence of attributes and goodness of fit. **Linear Correlation and Regression Analysis:** Introduction, linear regression model, regression coefficient, lines of correlation, rank correlation	6

Text Books:

1. Gupta, S.C, and Kapur, J.N., ***"Fundamentals of Mathematical Statistics***", Sultan Chand, Ninth Edition, New Delhi,1996.
2. Johnson. R. A., ***"Miller & Freund's Probability and Statistics for Engineers",*** Sixth Edition, Pearson Education, Delhi, 2000.
3. Douglas C. Montgomery and George C. Runger, "***Applied Statistics and Probability for Engineers",*** 5th Edition, 2011.

Reference books:

1. Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, ***"Probability and Statistics for Engineers and Scientists",*** Seventh Edition, Pearson Education, Delhi, 2002.

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2. Lipschutz. S and Schiller. J, ***"Schaum's outlines - Introduction to Probability and Statistics"***, McGraw-Hill, New Delhi, 1998.
3. S. M. Ross, "***Introduction to Probability and Statistics for Engineers and Scientists***" 4th edition.

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HS 305: INDUSTRIAL ECONOMICS AND MANAGEMENT

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Engineering Economics** - Technical efficiency, economic efficiency - cost concepts: elements of costs, opportunity cost, sunk cost, private and social cost, marginal cost, marginal revenue and profit maximization. **Supply and Demand:** Determinants of demand, law of demand, determinants of supply, law of supply, market equilibrium - elasticity of demand - types of elasticity, factors affecting the price elasticity of demand **National Income Concepts:** GDP and GNP, per capita income, methods of measuring national income. Inflation and deflation:	8
II	**Value Analysis** - Time value of money - interest formulae and their applications: single-payment compound amount factor, single-payment present worth factor, equal-payment series compound amount factor, equal-payment series sinking fund factor, equal-payment series present worth factor, equal-payment series capital recovery factor, effective interest rate. **Investment Analysis:** Payback period—average annual rate of return, net present value; Internal rate of return criteria, price changes, risk and uncertainty.	8
III	**Principles of Management:** Evolution of management theory and functions of management organizational structure - principle and types - decision making - strategic, tactical & operational decisions, decision making under certainty, risk & uncertainty and multistage decisions & decision tree. **Human Resource Management:** Basic concepts of job analysis, job evaluation, merit rating, wages, incentives, recruitment, training and industrial relations.	8
IV	**Financial Management**: Time value of money and comparison of alternative methods; costing – elements& components of cost, allocation of overheads, preparation of cost sheet, break even analysis - basics of accounting - principles of accounting, basic concepts of journal, ledger, trade, profit & loss account and balance sheet. **Marketing Management:** Basic concepts of marketing environment, marketing mix, advertising and sales promotion.	8

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	Project Management: Phases, organization, planning, estimating, planning using PERT & CPM.	

Text Books:

1. PanneerSelvam, R, **"*Engineering Economics***", Prentice Hall of India Ltd, New Delhi.
2. Dwivedi, D.N**.,** **"*Managerial Economics**, 7/E"*, Vikas Publishing House.

Reference Books:

1. Sullivan, W.G, Wicks, M.W., and Koelling. C.P., **"*Engg. Economy 15/E*"**,Prentice Hall, New York, 2011.
2. Chan S. Park, **"*Contemporary Engineering Economics***", Prentice Hall of India, 2002.
3. F. Mazda, ***Engg.Management***, Addison Wesley, Longman Ltd., 1998.
4. O. P. Khanna***, Industrial Engg.and Management,***DhanpatRai and Sons, Delhi, 2003.
5. P. Kotler, ***Marketing Management, Analysis, Planning, Implementation and Control***,Prentice Hall, New Jersey, 2001.
6. VenkataRatnam C.S &Srivastva B.K, ***Personnel Management and Human Resources,*** Tata McGraw Hill.
7. Prasanna Chandra, ***Financial Management****: Theory and Practice*, Tata McGraw Hill.
8. Bhattacharya A.K., ***Principles and Practice of Cost Accounting***, Wheeler Publishing.
9. Weist and Levy, ***A Management guide to PERT and CPM***, Prantice Hall of India.
10. Koontz H.,O'Donnel C.,&Weihrich H, ***Essentials of Management***, McGraw Hill.

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CS-301: DATA STRUCTURE

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Data Structures:** Definition, primitive and derived data types, abstract data types, need for data structures, types of data structures. **Algorithm**: Definition, characteristics, development of algorithm, analysis of complexity:- time complexity, space complexity, order of growth, asymptotic notation with example, obtaining the complexity of algorithm. **Arrays:** Definition**,** 1d and 2d arrays, operations on arrays**,** sparse matrices, structures and arrays of structures.	**10**
II	**Linked list**: Representation of linked list in memory, allocation & garbage collection, operations on linked list, doubly linked lists, circular linked list, linked list with header node, applications. **Stacks:** representation of stack in memory, operations on stack and applications. **Queues:** Representation of queues in memory, operations on queues, circular queues, double ended queues, priority queues, applications.	**10**
III	**Trees**: Introduction, representation of tree in memory. **Binary Trees:** Terminology, binary tree traversal, binary search tree, insertion, deletion & searching in binary search tree, heap trees, types of heap trees, insertion, deletion in heap tree with example, heap sort algorithm, introduction of AVL trees & B-trees. **Graphs:** Definition, representation of graph (adjacency matrix, adjacency list), traversing a graph (DFS & BFS), dijkstra's algorithm for shortest distance, minimum spanning tree.	**10**
IV	**Searching and sorting:** Need for searching and sorting, linear and binary search, insertion sort, selection sort, merge sort, quick sort, radix sort and bubble sort. **Hash Tables:** Introduction, hash function, collision resolution techniques in hashing, deletion from hash table.	**9**

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Text Books:

1. Seymour Lipschutg : Theory and practice of Data structure , Tata Mc. Graw Hill 1998
2. Tenebaum, A. Lanhgsam Y and Augensatein , A. J: Data structures using C++ , Prentice Hall of India.

Reference Books:

1. Data structure and Algorithms in C++ by Micheal T. Goodrich, Wiley India publication.
2. Data structures, R.Venkatesan, S.Lovelyn Rose, Wiley India publication.
3. Data Structure using C++ By Patil, Oxford University press.
4. Data Structure , Algorithm and Object-Oriented programming , Gregory L. Heileman, Tata Mc-Graw Hills.
5. S. Sahni , " Data structure Algorithms ad Applications in C++", WCB/McGraw Hill.
6. J.P. Tremblay and P.G. Sorenson, "An Introduction to Data Structures with applications", Tata McGraw Hill.

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CS-302: OBJECT ORIENTED PROGRAMMING USING C++

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	Review of basic concepts of object-oriented programming, comparison between procedural programming paradigm and object-oriented programming paradigm. **Classes and Objects:** Specifying a class, creating class objects, accessing class members, access specifiers – public, private, and protected, *c*lasses, objects and memory, static members, the const keyword and classes, static objects, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes. **Console Based I/O:** Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of I/O stream classes, formatting output, formatting using *ios* class functions and flags, formatting using manipulators.	**10**
II	**Constructors and Destructors:** Need for constructors and destructors, copy constructor, dynamic constructors, destructors, constructors and destructors with static members, initializer lists. **Operator Overloading and Type Conversion:** Defining operator overloading, rules for overloading operators, overloading of unary operators and various binary operators, overloading of new and delete operators, type conversion - basic type to class type, class type to basic type, class type to another class type. **Inheritance:** Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.	**10**
III	**Pointers and Dynamic Memory Management:** Understanding pointers, accessing address of a variable, declaring & initializing pointers, accessing a variable through its pointer, pointer arithmetic, pointer to a pointer, pointer to a function, dynamic memory management - new and *delete* operators, pointers and classes, pointer to an object, pointer to a member, *this* pointer, self-referential classes, possible problems with the use of pointers - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.	**10**

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	Virtual Functions and Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors &polymorphism.	
IV	**Exception Handling:** Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, re-throwing an exception, specifying exceptions. **Templates and Generic Programming:** Function templates, class templates, class templates and nontype parameters, templates and inheritance, templates and friends, templates and static members. **Managing Data Files:** File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files, data formatting in memory buffers.	**9**

Text Books:

1. Lippman, S.B. and Lajoie, J., C++Primer, Pearson Education (2005) 4th ed..
2. Stroustrup, Bjarne, The C++ Programming Language, Pearson Education (2000)3rd ed.
3. Kanetkar Y., Let Us C++, BPB Publications, 2nded.
4. Balaguruswamy E., Object Oriented Programming with C++, McGraw Hill, 2013.

Reference Books:

1. Eills, Margaret A. and Stroustrup ,Bjarne, The Annonated C++ Reference Manual, Pearson Education (2002).
2. Rumbaugh, J.R., Premerlani, W. and Blaha, M., Object Oriented Modeling and Design with UML, Pearson Education (2005) 2nd ed.
3. Kanetkar, Yashvant, Let us C++, Jones and Bartlett Publications (2008) 8th ed.
4. Brian W. Kernighan, Dennis M. Ritchie, The C++ Programming Language, Prentice Hall)
5. Schildt H., C++: The Complete Reference, Tata Mcgraw Hill, 2003.

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EC-302: DIGITAL ELECTRONICS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Number system & codes:** Binary arithmetic (addition, subtraction, multiplication and division), floating point numbers, diminished radix and radix compliments, BCD codes, 8421 code, excess-3 code, gray code, error detection and correction: parity code, hamming code. **Logic gates:** Positive & negative logic, tristate logic gates, schmitt gates, totem pole output and open collector output; fan in and fan out of logic gates, buffer & trans-receivers, IEEE/ANSI standards symbols.	**10**
II	**Boolean algebra simplification techniques:** Sum of products and product of sums simplification, NAND and NOR implementation incompletely specified functions, Ex-OR functions, the map method: two, three, four and five variable maps; the tabulation method, determination of prime implicants, selection of essential prime implicants. **Logic families:** Classification of digital IC's, significance & types, characteristics parameters, TTL, ECL, CMOS logic families, NMOS & PMOS logic, interfacing between TTL & CMOS.	**10**
III	**Combinational logic circuits:** Implementing combinational logic, arithmetic circuits: half adder, full adder, half subtractor, full subtractor, multiplexer, encoder, demultiplexer & decoder. **Flip flops:** Introduction, S-R flip -flops, Level & edge triggered flip flops, JK flip-flop, D flip-flop, T flip-flop, Master slave JK flip-flop, Flip flop timing parameters & applications.	**10**
IV	**Shift Registers:** Shift register, ring counter, universal shift registers, SISO, PISO, SIPO & PIPO. **Counters:** Asynchronous ripple counter, synchronous counter, modulus of a counter, binary ripple counter, up & down, decade counter. **Semiconductor Memories:** Classification of memories, ROM, RAM, static	**9**

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	memory and dynamic memory, programmable logic arrays, charged-coupled device memory	

Text Books

1. Digital Electronics -Principle & Integrated circuits, Anil K Maini, Wiley India edition
2. Modern Digital Electronics, R.P.Jain, TMH
3. M. Morris Mano, Digital Design, Prentice Hall of India.

Reference Books

1. Digital Principle and Applications, Malvino and Leach, TMH
2. Digital Electronics, Kharate, Oxford University Press

CS-303: COMPUTER ARCHITECTURE AND ORGANIZATION

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basics of Digital Electronics:** Codes, logic gates, flip flops, registers, counters, multiplexer, demultiplexer, decoder, and encoder. **Register Transfer and Micro operations:** Register transfer language, register transfer, bus & memory transfer, logic micro operations, shift micro operation. **Computer Arithmetic:** Unsigned, signed and floating point data representation, addition, subtraction, multiplication and division algorithms. booths multiplication algorithm.	**10**
II	**Basic Computer Organization:** Instruction codes, computer instructions, timing & control, instruction cycles, memory reference instruction, input/output & interrupts, complete computer description & design of basic computer. **Control Unit:** Hardwired vs. micro programmed control unit. **Central Processing Unit:** General register organization, stack organization, instruction format, addressing modes, data transfer & manipulation, program control, RISC, CISC.	**10**
III	**Input-Output Organization:** Peripheral devices, I/O interface, Modes of data transfer: Programmed I/O, Interrupt-Initiated I/O, DMA transfer, I/O processor. Serial Communication. **Memory Unit:** Memory hierarchy, processor vs. memory speed, main memory, auxiliary memories, high-speed memories, cache memory, associative memory, virtual memory, and memory management hardware.	**10**
IV	**Introduction to Parallel Processing:** Flyn's classification, pipelining, arithmetic pipeline, instruction pipeline, characteristics of multiprocessors, interconnection structures, interprocessor arbitration, interprocessor communication & synchronization. Performance evaluation SPEC marks LINPACK Whetstone Dhrystone etc., transaction processing benchmarks. **Case Studies:** Case studies of some contemporary advanced architecture for	**9**

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	processors of families like Intel, AMD, IBM etc./Seminar on state-of the-art technology.	

Text Books:

1. Mano, Morris M., Computer System Architecture, Prentice Hall
2. Hayes, J.P., Computer Architecture and Organization, McGraw Hill

Reference Books:

1. Hennessy, J.L., Patterson, D.A, and Goldberg, D., Computer Architecture A Quantitative Approach, Pearson Education Asia
2. Leigh, W.E. and Ali, D.L., System Architecture: software and hardware concepts, South Wester Publishing Co.

HS 306: SOCIOLOGY AND ELEMENTS OF INDIAN HISTORY FOR ENGINEERS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

- To familiarize the students with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues and problems in Indian society.
- The enable the students to analyse critically the social processes of globalization, modernization and social change.
- To help the students imbibe such skills that will enable them to be better citizens and human beings.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to sociological concepts** - Structure, system, organization, social institution, culture social stratification (caste, class, gender, power). **Understanding social structure and social processes -** Perspectives of Marx and Weber.	**6**
II	**Political economy of Indian society** - Industrial, urban, agrarian and tribal society. **Social change in contemporary India** - Modernization and globalization, secularism and communalism.	**6**
III	**Introduction to Elements of Indian History -** What is history? History sources - archaeology, numismatics, epigraphy and archival research. **Indian history and periodization -** Evolution of urbanization process: first, second and third phase of urbanization.	**6**
IV	**From feudalism to colonialism -**The coming of British; modernity and struggle for independence. **Issues and concerns in post-colonial India (upto 1991) -** Issues and concerns in post-colonial India 2nd phase (LPG decade post 1991)	**6**

Text Books:

1. Desai, A.R. (2005), ***Social Background of Indian Nationalism***, Popular Prakashan.
2. Giddens, A (2009), ***Sociology, Polity***, 6thEdition.

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3. Chandoke, Neera & Praveen Priyadarshi(2009), ***contemporary India: Economy, Society and Politics***, Pearson.

Reference Books:

1. Guha, Ramachandra(2007), ***India After Gandhi***, Pan Macmillan.
2. Haralambos M, RM Heald, M Holborn (2000), ***Sociology, Collins***.
3. Sharma R. S..(1965), ***Indian feudalism***, Macmillan.
4. Gadgil, Madhab&RamchandraGuha(1999) - ***This Fissured Land: An Ecological Histry of India,*** OU Press.

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HS 307: GERMAN LANGUAGE – I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVES:

- To read and write short, simple texts.
- To understand a dialogue between two native speakers and also take part in short, simple conversations using the skills acquired.
- To offers opportunities for students of engineering for higher studies, research and employment in Germany.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**WichtigeSprachhandlungen:** Phonetics – Sichbegrüßen - Sich und anderevorstellenformell / informell - Zahlen von 1 bis 1 Milliarde - verstehen&sprechen. **Grammatik:** regelmäßigeVerbenimPräsens - "sein" und habenimPräsens - PersonalpronomenimNominativ	**6**
II	**WichtigeSprachhandlungen:** Telefon Nummernverstehen und sprechen Uhrzeitenverstehen und sagenVerneinung "nicht und kein" (formell und informell). **Grammatik**: Wortstellung – Aussagesatz – W-Frage und Satzfrage (Ja/NeinFrage) Nomenbuchstabieren und notierenbestimmter und unbestimmter Artikelund Negativartikelim Nom. &Akkusativ	**6**
III	**WichtigeSprachhandlungen:** Tageszeitenverstehen und über Terminesprechen-Verabredungenverstehen – Aufgabenim Haushaltverstehen. **Grammatik:** PersonalpronomenimAkkusativ und Dativ - W-Fragen "wie, wer, wohin,wo, was usw.-Genitivbei Personennamen - ModalverbenimPräsens "können, müssen,möchten"	**6**
IV	**WichtigeSprachhandlungen:** Sichaustauschen, was man kann, muss – BezeichnungenLebensmittel – Mengenangabenverstehen – PreiseverstehenundEinkaufzettelschreiben	**6**

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	Grammatik: Wortstellung in SätzenmitModalverben – Konnektor ”und” – “noch”-kein-------mehr – “wieviel, wieviele, wie alt, wielange” – PossessivartikelimNominativ	
V	**WichtigeSprachhandlungen:** Freizeitanzeigenverstehen – HobbysundSportarten Anzeigenfür Freizeitpartnerschreibenbzw. daraufantworten –Vorlieben und Abneigungenausdrucken **Grammatik:**Verbenmit Vokalwechselim Präsens – ModalverbenimPräsens“dürfen, wollen und mögen - “haben und sein” imPräteritum – regelmäßigeVerbenimPerfekt – Konnektoren “denn, oder, aber.	**6**

Text Book

1. Studio d A1. Deutsch alsFremdsprache with CD.(Kursbuch und Sprachtraining).

References

1. German for Dummies
2. Schulz Griesbach

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HS 308: FRENCH LANGUAGE - I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVES:

- To read and write short, simple texts.
- To understand a dialogue between two native speakers and also take part in short, simple conversations using the skills acquired.
- To offers opportunities for students of engineering for higher studies, research and employment in French.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Grammar and Vocabulary:** Usage of the French verb "se presenter", a verbof self- introduction and how to greet a person- "saluer". **Listening and Speaking:** The authentic sounds of the letters of the Frenchalphabet and the accents that play a vital role in the pronunciation of thewords. **Writing:** Correct spellings of French scientific and technical vocabulary. **Reading:** Reading of the text and comprehension – answering questions.	5
II	**Grammar and Vocabulary:** Definite articles, "prepositions de lieu" subject pronouns. **Listening and Speaking:** Pronunciation of words like Isabelle, presentezandla liaison – vousetes, vousappelez and role play of introducing each other –group activity. **Writing:** Particulars in filling an enrolment / registration form. **Reading Comprehension:** reading a text of a famous scientist and answeringquestions.	6
III	**Grammar and Vocabulary:**Verb of possession "avoir' and 1st group verbs"er", possessive adjectives and pronouns of insistence- moi, lui..andnumbers from 0 to 20. **Listening and Speaking: N**asal sounds of the words like feminine, ceinture,parfum and how to ask simple questions on one's name, age, nationality,address mail id and telephone number. **Writing:** Conjugations of first group verbs and paragraph writing on self – introduction and introducing a third person. **Reading Comprehension:** reading a text that speaks of one's profile and	6

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	answering questions	
IV	**Grammar and Vocabulary:** Negative sentences, numbers from 20 to 69, verb"aimer"and seasons of the year and leisure activities. **Listening and Speaking:** To express one's likes and dislikes and to talk ofone's pastime activities (sports activities), je fais du ping-pong and nasalsounds of words – janvier, champagne. **Writing**-Conjugations of the irregular verbs: faire and savoir and their usage.Paragraph writing on one's leisure activity- (passé temps favori). **Reading:** a text on seasons and leisure activities – answering questions.	**6**
V	**Grammar and Vocabulary:** les verbes de direction- to ask one's way and togive directions, verbes- pouvoir and vouloir and 2nd group verbs, a droite, lapremiere a gauche and vocabulary relating to accommodation. **Listening and Speaking:**To read and understand the metro map and henceto give one directions – dialogue between two people. **Writing:** Paragraph writing describing the accommodation using the differentprepositions like en face de, derriere- to locate. **Reading Comprehension:**A text / a dialogue between two on location anddirections- ouest la poste/ la pharmacie, la bibliotheque?.....	**6**

Text Book

1. Tech French

References

1. French for Dummies.
2. French made easy-Goyal publishers
3. Panorama

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CS-311: DATA STRUCTURE LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	2 hrs

Experiments as per the topics in the syllabus for the course 'Data Structure lab.' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

1. Write recursive programme which computes the nth Fibonacci number
2. Write recursive programme which computes the factorial of a given number.
3. Write a program to implement linear search using arrays
4. Write a program to implement binary search using arrays
5. Write c program to implement bubblesort, to sort a given list of integers in ascending order.
6. Program to implement insertion sort to sort a given list of integers in ascending order.
7. program to implement INSERTION SORT to sort a list of numbers
8. Write a C program that implement mergesort, to sort a given list of integers in ascending order.
9. Write C programs that implement stack using arrays
10. Write C programs that implement stack using linked list Program
11. Write c programs that implement Queue using array
12. Write C programs that implement Queue using linked lists.
13. Write program to implement linked list operations (Creation, Insertion, Deletion, reversing).
14. Write a program to implement binary tree
15. Write a program to implement heap sort using arrays

CS-312: C++ Programming Lab

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	2 hrs

Experiments as per the topics in the syllabus for the course 'C++ Programming lab.' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

1. Write a program in C++ to exchange the content of two variables using call by reference
2. Write a program in C++ to search the 2nd largest & smallest element in an array.
3. Write a C++ program to implement a student class having roll no., name, rank, addresses as data members.
4. Write a program in C++ demonstrating the Static Data member.
5. Write a program in C++ demonstrating the public, protected and private parameters.
6. Write a program in C++ to demonstrate constructor with default argument.
7. Write a program in C++ to demonstrate the Constructor Overloading, assume desired parameters.
8. Write a program in C++ to create the class shape, and overload the function to return the perimeters of the different shapes.
9. Write a program in C++ to demonstrate destructor in inheritance.
10. Write a program in C++ to demonstrate multiple inheritance.
11. Write a program in C++ to demonstrate multilevel inheritance.
12. Write a program in C++ to demonstrate public, private and protected inheritance.
13. Write a program in C++ to demonstrate virtual function.
14. Write a program in C++ to demonstrate friend function.
15. To demonstrate function overriding.
16. Write a program in C++ to copy & append the content of file into another. (Assume suitable data)
17. Write a C++ program implement a class 'Complex' of complex numbers. The class should be include member functions to add and subtract two complex numbers. .
18. Write a C + + program to implement matrix class. Add member function to transpose the matrix.
19. Write a C ++ program to implement a class for complex numbers with add and multiply as member functions. Overload ++ operator to increment a complex number.

EC-306: DIGITAL ELECTRONICS LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	I.A.	ESE	Total	
0	0	2	1	30	20	50	2 hrs

Experiments as per the topics in the syllabus for the course 'Digital Electronics lab.' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

List of Experiments:

1. To verify the truth table of logic gates realize AND, OR, NOT gates
2. To realize AND, OR gates using diodes and resistors
3. Implementation of X-OR and X-NOR using NAND and NOR gates.
4. Design of a digital circuit using K-map and realise by using NAND-NAND or NOR-NOR gates.
5. Design of an adder logic circuit.
6. Design of a subtractor logic circuit.
7. Implementation of logic equations using MUX, DEMUX
8. Design of an encoder logic circuit.
9. Design of a decoder logic circuit.
10. Conversion from one flip flop to another.
11. Design of a counter and its realization using FFs.
12. Design of a shift register and its realization using FFs.
13. Design BCD to seven-segment display using 7447 IC

NOTE: The above experiments may also be performed on simulation software

MA 401: OPTIMIZATION AND CALCULUS OF VARIATIONS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVES:

The objective of this course is to present different methods of solving optimization problems in the three areas of linear programming, nonlinear programming, and classical calculus of variations. In addition to theoretical treatments, there will be some introduction to numerical methods for optimization problems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** A survey of some simplified examples of common real world situations leading to optimization problems, basic formulation and theory of optimization problems. **Linear programming:** Linear programming (optimization of linear functions subject to linear constraints): basic theory; simplex method, duality, practical techniques.	6
II	**Linear programming:** Basic LPP - solution techniques (Simplex, Artificial Basis), complimentary slackness theorem, fundamental theorem of duality, degenerate solutions, cycling, applications - elements of dynamic programming including hamiltonian, bellman's optimality principle. **Transportation and Assignment Problems:** Solution of a balanced transportation problem, degeneracy in transportation problems and alternate solutions, mathematical problems in formulation of assignment problems.	7
III	**Nonlinear programming:** Nonlinear programming (optimization of nonlinear functions subject to constraints) with lagrange multipliers, Karush-Kuhn-Tucker optimality conditions, convexity, duality. **Approximation methods for nonlinear programming:** Line search methods, gradient methods, conjugate gradient methods, Networking techniques – PERT and CPM.	6

IV	**Calculus of Variations:** Basic definitions -functional, extremum, variations, function spaces; necessary conditions for an extremum, euler-lagrange equation, convexity and it's role in minimization, minimization under constraints; existence and nonexistence of minimizers, applications - isoperimetric problems, geodesics on the surface.	**6**

Text Books:

1. C. B. Gupta, ***"Optimization Techniques in Operation Research,"*** I. K. InternationalPublishing House Pvt. Ltd.
2. A. S. Gupta, ***Calculus of Variations and Applications***, PHI Prantice hall India.
3. Mukesh Kumar Singh, ***"Calculus Of Variations"***, Krishna Prakashan Media (P) Ltd.
4. J. K. Sharma, ***Operations Research – Problems and Solutions***, Macmillian Pub.

Reference books:

1. I. M.Gelf and S. V. Fomin, ***"Calculus of Variations"*** Dover Publications IncMineola,New York.
2. Purna Chand Biswal, ***"Optimization in Engineering***, Scitech Publications India Pvt. Ltd.
3. B. S. GREWAL, ***Higher Engineering Mathematics***, Krishna Publications.
4. G. Hadly, ***Linear Programming***, Narosa Publishing House.
5. KantiSwarup, P. K. Gupta and Manmohan, ***"Operations Research,"*** Sultan Chand & Sons.

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HS 409: HUMAN VALUES AND PROFESSIONAL ETHICS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVES:

- To enable students to explore the purpose of value education.
- To understand the purpose of harmony with oneself, family, society and nature.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction –Need and Basic Guidelines** 1. Understanding the need, basic guidelines, content and process of value education 2. Self-exploration – purpose, content and process, 'natural acceptance' and experiential validation – as the mechanism for self-explanation.	6
II	**Process for Value Education** 1. Continuous Happiness and Prosperity – A look at basic Human Aspirations. 2. Right Understanding, Relationship and Physical Facilities – basic requirements for fulfillment of aspirations of every human being with their correct priority 3. Understanding Happiness and prosperity – A critical appraisal of the current scenario. 4. Method to fulfill the human aspirations; understanding and living in harmony at various levels	**7**
III	**Harmony in Human Beings** 1. Understanding human being as a co-existence of the self and the 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)	**7**
IV	**Harmony in Myself and body** 1. Understanding the characteristics and activities of 'I' and harmony	**6**

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	in 'I' 2. Understanding the harmony of I with the Body: Sanyam and Swasthya: correct appraisal of Physical needs, meaning of Prosperity in detail.	
V	**Harmony in Family, Society and Nature** 1. Understanding harmony in the family, society and nature. 2. Understanding values in 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.	**6**

Text Books

1. R R Gaur, RSangal and GP Bagaria, ***A Foundation Course in value Education***, Published by Excel Books (2009).
2. R R Gaur, R Sangal and G P Bagaria, ***Teacher's Manual (English),*** 2009.

Reference Books

1. E.F. Schumacher, ***Small is Beautiful; a study of economics as if people mattered***, Blond & Briggs, Bratain, 1973.
2. PL Dhar, RR Gaur, ***Science and Humanism***, common wealth publishers, 1990.
3. A.N. Tripathy, ***Human values,*** New Age International Publishers, 2003.
4. E.G. Seebauer& Robert, L BERRY, ***Foundational of Ethics for Scientists &Engineers***, Oxford University Press, 2000.
5. M. Govindrajran, S.Natrajan& V.S. Senthi Kumar, ***Engineering Ethics (including human Values),*** Eastern Economy Edition, Prentice hall of India Ltd.
6. B.L. Bajpai, 2004, ***Indian Ethos and Modern Management***, New Royal book Co; Lucknow, 2004, Reprinted 2008.

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CS-401: DATABASE MANAGAMENT SYSTEMS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Concept & overview of dbms, data models, database languages, database administrator, Database Users, Three Schema architecture of DBMS. **Entity-Relationship Model:** Basic concepts, design issues, mapping constraints, keys, entity-relationship diagram, weak entity sets, extended E-R features.	10
II	**The Relational Data Model & Algebra :** Relational model, structure of relational databases, relational algebra, relational calculus, introduction to views, updates on views **SQL and Integrity Constraints:** Concept of DDL, DML, DCL, basic structure, set operations, aggregate functions, null values, domain constraints, referential integrity constraints, assertions, views, nested sub queries, database security application development using SQL, stored procedures and triggers.	10
III	**Relational Database Design:** Functional dependency, different anomalies in designing a database., normalization using functional dependencies, decomposition, Boyce-Codd normal form, 3NF, normalization using multi-valued dependencies, 4NF, 5NF. **Internals of RDBMS:** Physical data structures, query optimization, join algorithm, statistics and cost base optimization, transaction processing, concurrency control and recovery management, transaction model properties, state serializability, lock base protocols, two phase locking.	10
IV	**Failure Recovery and Concurrency Control:** Issues and models for resilient operation -undo/redo, logging-protecting against media failures. **Concurrency Control:** Serial and serializable schedules, conflict serializability, enforcing serializability by locks-locking systems with several lock modes, concurrency control by timestamps, validation. **Transaction Management:** Serializability and recoverability-view, serializability, resolving deadlocks-distributed databases: commit and lock.	9

Text Books

1. Ramez Elmasri, Shamkant B. Navathe, ***"Fundamentals of Database systems"***, Pearson.
2. Korth, Silberschatz, Sudarshan, ***"Database concepts"***, MGH.

Reference Books:

1. R. Ramakrishnan and J. Gehrks, ***"Database Management System"***, MGH, International edition.

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2. C. J. Date, ***"Data Base Systems"***, Addison Wesley, Pearson Education,
3. Chakrabarti, ***"Advance Database Management Systems"*** , Wiley Dreamtech.
4. Ivan Bayross, ***"SQL and PL/SQL"***, BPB Publication.

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CS-402: OPERATING SYSTEMS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basic Concept of Operating System:** Evolution of operating system, fundamental of operating system functions, multiprogramming, multiprocessing, time-sharing systems and real time systems, software layers & virtual machine, operating system principles, structuring methods (monolithic, layered, modular, microkernel models).	10
II	**Process Management:** Processor scheduling, threads, scheduling model, CPU scheduling algorithms, CPU scheduling algorithm, concurrent process - introduction, concurrency specifications, process graphs, process creation & termination, introduction to conflicts due to concurrency, simple examples to illustrate the problem, critical section problem, semaphores, classical process co-ordination problem. **Deadlock:** introduction, analysis of conditions, prevention & avoidance, detection & recovery.	10
III	**Memory Management:** Contiguous memory allocation, overlays, fixed partitioning vs. variable partitioning, paged memory, segmentation and virtual memory, page replacement algorithms. **File Management:** File concepts, access methods, directory structure, file protection, file system structure, allocation methods, and secondary storage management - disk structure, disk scheduling, disk management, swap-space management, and disk reliability.	10
IV	**Protection and security:** Security attacks, security mechanisms and policies. **Virtual Machines:** Types of virtualization (including hardware/software, OS, server, service, network). Unix/Linux/ case study / seminar on state-of the-art technology.	9

Text Books

1. Silberschatz A, Galvin P.B. and Gagne G., ***"Operating System Concepts"***, John Wiley.
2. Stallings Willam, ***"Operating Systems Internals and Design Principles"***, Prentice Hall.

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Reference Books

1. Dhamdhere D.M., ***"Operating Systems: A Concept Based Approach"***, McGraw Hill.
2. Flynn I.M. and Mc Hoes A.M., ***"Understanding Operating Systems"***, Thomson.

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CS-404: THEORY OF COMPUTATION

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals:** Automata Definition, applications, finite state machine, definitions, finite automaton model, acceptance of strings, deterministic finite automaton and non deterministic finite automaton, transition diagrams. **Finite Automata**: NFA with Λ-transitions, significance, equivalence of NFA & DFA, equivalence between NFA with and without Λ-transitions, minimization of FSM, equivalence between two FSMs, finite automata with output- Moore and Melay machines.	**10**
II	**Regular Languages:** Regular sets, regular expressions, identity rules, constructing finite automata for a given regular expressions, Arden's theorem, conversion of finite automata to regular expressions, pumping lemma of regular sets, closure properties of regular sets (proofs not required), Myhill-Nerode theorem and minimization of finite automata, minimization algorithm.	**10**
III	**Grammar Formalism:** Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, context free grammar, derivation trees, sentential forms, right most and leftmost derivation of strings. **Context Free Grammars:** Ambiguity in context free grammars, minimization of context free grammars, Chomsky normal form, Greibach normal form. **Push Down Automata**: Push down automata, definition, model, acceptance of CFL, acceptance by final state and acceptance by empty state and its equivalence, applications of push down machines.	**10**
IV	**Turing Machine**: Turing Machine, definition, model, design of TM, types of turing machines (proofs not required), post correspondence problems and halting problem of turing machine. **Chomsky Hierarchies:** Chomsky hierarchies of grammars, unrestricted grammars, context sensitive languages, relation between languages of classes.	**9**

	Computability: Basic concepts, primitive recursive functions.	

Text Books:

1. Hopcroft H. E. and Ullman J. D., ***"Introduction to Automata Theory Languages and Computation"***, Pearson Education.
2. Sipser, ***"Introduction to Theory of Computation"*** Thomson.

Reference Books:

1. Daniel I.A. Cohen, ***"Introduction to Computer Theory"***, John Wiley
2. John C Martin, ***"Introduction to languages and the Theory of Computation"***, TMH
3. Lewis H.P. and Papadimition C.H., ***"Elements of Theory of Computation"***, Pearson /PHI
4. Mishra and Chandrashekaran, ***"Theory of Computer Science, Automata Languages and Computation"***, PHI

EC-402: MICROPROCESSORS & PERIPHERALS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Evolution of microprocessor, 8085 microprocessor: features, architecture and pin configuration; 8085 instruction: instruction word size, opcode format, data format, addressing modes; 8085 machine cycles and timing diagrams. **Typical instruction set of 8085:** Data transfer instructions, arithmetic instructions, logic and bit manipulation instructions, branch instructions, machine control instruction.	**10**
II	**Programming:** Development of assembly language program. **Interrupts & data transfer:** Interrupt system of 8085, Stack and subroutine. **Memory interfacing:** Types of memory, memory map and address range, memory interfacing decoding techniques: absolute and partial.	**10**
III	**I/O interfacing:** Basic interfacing concept using mapping techniques: I/O mapped I/O and memory mapped I/O **Serial I/O:** Basic concepts in serial I/O, asynchronous serial data communication using SOD and SID. **Peripheral devices & applications of microprocessor:** Description of the 8251 programmable communication interface, the 8255 programmable peripheral interface, the 8257 DMA controller.	**10**
IV	**Trends in microprocessor Technology:** 8086/8088 microprocessor: main features, architecture-the execution unit and bus interface unit, memory segmentation, memory addressing, 8086/8088 hardware pin signals, 8086 minimum and maximum modes of operation; introduction to 8087 floating point coprocessor and its connection to host 8086.	**9**

Text Books:

1. Gaonkar, ***"Microprocessor Architecture, Programming and Application with 8085"***, PHI.
2. D.V.HALL, ***"Microprocessors and Interfacing"***, McGraw Hill.
3. Senthil, Saravanam, ***"Microprocessor and Microcontrollers"***, Oxford University Press.

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Reference Books:

1 A.P. Mathur, ***"An Introduction to Microprocessor"***, TMH.
2 Kenneth J Ayala, ***"The 8086 Microprocessor"***, Cengage Learning
3. B.Ram, ***"Fundamentals of Microprocessor & Microcomputers"***, Dhanpat Rai & Co.

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HS 410: LAW FOR ENGINEERS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

- To familiarize students (Prospective engineers) with elementary knowledge of laws that would be of utility in their profession.
- To familiarize students with the constitution of India and laws in new areas viz. IPR, ADR, Human Rights, Right to Information, Corporate law, Law relating Elections and Gender Studies.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Constitutional Law:** Nature of Indian Constitution (features), fundamental rights, duties and directive Principles of State Policy (DPSP's), forms of Governments, structure of Government of India, role and responsibility of executive, legislature/parliament and judiciary, nature of Indian federal system, center state and relations. Basic structure of the Indian constitution, basic features of the Indian, constitutional amendments – Golak Nath, Keshwananda Bharti, Maneka Gandhi (1978) and S.R. Bommai case (1994), (floor test).	6
II	**Law of contract:** General principles of Indian Contract Act, 1862, kinds of Government contracts and dispute settlement, standard and printed form of contract, essential elements of valid contract proposal, acceptance communication and revocation thereof, relevance of time in contractual obligation. Main objectives of Arbitrates and Conciliation Act-1996, tort and law of tort, general principles of tort law, classifications of torts: property vs. person.	6
III	**Administrative Law:** Evolution, nature and its scope, conceptual objection against growth of administrative rule of law and separation of power, clarification of administrative actions, judicial review of administrative actions, exclusion of judicial review and concept of "Ombudsman";Right to Information Act, 2005 (Sub Section 1 - 20) **Environmental Law:** Definition, meaning and its nature, environmental (Protection) Act-1986, Water (Preservation and Control of Pollution) Act-1974, Air (Prevention and Control of Pollution) Act-1981; Environmental pollution, overall remedies and procedures.	8

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IV	**Human Rights:** Legality of human rights, universal declaration of human rights, 1948, difference between civil and political rights, individual and human rights - human rights of child, weaker section of society, prisoners, and refugees, International Human Rights Commission.	**6**

Text Books:

1. D.D. Basu, ***Shorter Constitution of India***, Prentice Hall of India, (1996)
2. MeenaRao, ***Fundamental concepts in Law of Contract***, 3rd Edn. Professional Offset, (2006)
3. H.O.Agarwal, ***International Law and Human Rights***, Central Law Publications, (2008)

Reference Books:

1. H.M. Seervai, ***Constitutional Law of India***, Tripathi Publications, (1993).
2. S.K. Kapur, ***Human Rights under International Law and Indian Law,*** Central Law Agency, (2001)
3. NeelimaChandiramani, ***The Law of Contract: An Outline***, 2nd Edn. Avinash Publications Mum, (2000)
4. Avtarsingh, ***Law of Contract***, Eastern Book Co., (2002).
5. Anson W.R.(1979), ***Law of Contract***, Oxford University Press

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HS 411: GERMAN LANGUAGE – II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs
Prerequisite							
HS 302: GERMAN LANGUAGE - I							

COURSE OBJECTIVES:

- To enable the students to speak and understand about most of the activitiesin the day to day life.
- The students will be able to narrate their experiences in Past Tense.
- The students will be able to understand and communicate even with German Nationals.
- By the end of Phase – II the students will have a reasonable level of conversational skills.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Wichtige Sprachhandlungen:** Zimmersuche, Möbel **Grammatik**: Verbenmittrennbaren Vorsilbenim Präsens und Perfekt. Verbenmittrennbaren Vorsilben und Modalverbenim Präsens. Verbenmituntrennbaren Vorsilbenim Perfekt.Unregelmäßige undgemischteVerbenimPerfekt.	6
II	**Wichtige Sprachhandlungen**: Kleidung ,Farben, Materialien. **Grammatik:** formelle Imperativsätzemit "Sie" informelle Imperativsätze Vorschlägemit "wir" – "sollen/wollenwir" - Sollich? Modalpartikeln "doch""mal" "doch mal.	6
III	**Wichtige Sprachhandlungen:** Sehenswürdigkeite (Prater, BrandenburgerTör, Kolossium, Eifeltürm). **Grammatik:** Ortsangabenmit Akk. Und Dativ "alle","man" Indefinitepronomen"etwas", "nichts".	6
IV	**Wichtige Sprachhandlungen:** Essen und TrinkenimRestaurant, Partyvorbereitung und Feier. **Grammatik:** NomenausAdjektivennach "etwas"und "nichts" NomenausdemInfinitiv von Verben, zusammegesetzteNomen und ihreArtikel. Adjektiveim Nom.undAkk.nachunbestimmten Artikel, Negativartikel und Possessivartikel	6

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Text Books

1. Studio d A1. Deutsch alsFremdsprache with CD.(KursbuchundSprachtraining).

References

1. German for Dummies
2. Schulz Griesbach

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HS 412: FRENCH LANGUAGE - II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs
Prerequisite							
HS 303: FRENCH LANGUAGE - I							

COURSE OBJECTIVES:

- To enable the students communicate effectively with any French speaker
- To enable students to access information on the internet, send e mails, pass level 1 exam conducted by Alliance Française de Madras.
- To enable students to enhance their lexical and technical competence and have a competitive edge in the international market.By the end of Phase – II the students will have a reasonable level of conversational skills.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Grammar and Vocabulary:** The second group verbs: Finir, rougir, grossir,grandir. "Les preposition de temps": à, en, le, de 7h à 8h, jusqu' à, vers. Listening and Speaking – the semi- vowels: Voilà, pollutant. Writing - thedays of the week, months, technical subjects, time, "les spécialitésscientifiques et l' annéeuniversitaire, paragraph writing about time table. Reading: Reading of the text and comprehension – answering questions.	6
II	Grammar and Vocabulary – The adjectives, the nationality, feminine &masculinenoun forms "les métiersscientifiques". Listening and Speaking – Vowels: soirée, année, près de, très. Writing: Countries name, nationality, "les métiersscientifiques", numbers from:69 to infitive and some measures of unit.Reading Comprehension: reading a text.	6
III	Grammar and Vocabulary – near future, The demonstrative adjectives, Expressthe aim by using the verb, Listening and Speaking –"La liaison interdite – enhaut". Writing – some scientific terms, French expressions to accept an invitation. Sentence framing. Reading Comprehension – reading a text.	6
IV	Grammar and Vocabulary –the verbs: manger, boire, the partitive articles Listening and Speaking – "le 'e' caduc Writing- the food, the ingredients, fruits, vegetables, expression of quantity, paragraph writing about food habits. Reading – reading a text.	6

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Text Books

1. Tech French

References

1. French for Dummies.
2. French made easy: Goyal publishers.
3. Panorama.

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CS-411: DATABASE MANAGEMENT SYSTEM LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

Experiments as per the topics in the syllabus for the course 'Database Management System lab.' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

1. Introduction and concepts of SQL Basics: DDL DML DCL.
2. To create a simple database.
3. **To create a table with constraints:**
    a) Primary Key
    b) Unique
    c) Not Null
4. **Alter Table:**
    a) Adding column & multiple column
    b) changing column width
    c) Dropping column
    d) adding & dropping not null
    e) adding & dropping check constraints
    f) adding & removing primary key
    g) adding & removing foreign key
5. **Add a record to a database:**
    a) Simple insertion
    b) Accepting values from users
    c) inserting values into specific column
6. **Updating Tables:** updating with & without where clause
7. Generating Sub Query
8. **Deleting Records:** Delete Single, Multiple & All records
9. **Dropping tables:**
    a) Dropping table that has primary key
    b) Dropping table that has foreign key
10. **Retrieving data:**
    a) Retrieving all records
    b) retrieving specific coloumn,
    c) printing with user defined heading
11. Retrieving records using logical AND, OR, NOT, Between AND, IN, LIKE etc.
12. **Ordering Records:**
    a) Ascending
    b) Descending
    c) Concatenation
    d) Initcap
    e) Lower
    f) Upper
13. **Group Functions:**
    a) Group by clause
    b) having clause
    c) all clause

14. Adding and removing permissions (Grant and Revoke)
15. To implement the concept of join Cartesian product of tables selection of rows that matches project column specified in the select clause.

EC-405: MICROPROCESSOR & PERIPHERALS LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	I.A.	ESE	Total	
0	0	2	1	30	20	50	3 hrs

Experiments as per the topics in the syllabus for the course 'Microprocessor & peripherals lab' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

List of Experiments:

1. Addition and subtraction of two 8-bit numbers with programs based on different addressing modes of 8085A.
2. Addition and subtraction of two 16-bit numbers using 2's complement method.
3. Addition and subtraction of two 16-bit BCD numbers using DAA instruction.
4. Multiplication of two 8-bit numbers using the method of successive addition or shift & add method.
5. Division of two 8-bit numbers using the method of successive subtraction or shift & subtract method.
6. Program for block transfer and block exchange of data bytes.
7. Finding the smallest and largest element in a block of data.
8. Arranging the elements of a block of data in ascending and descending order.
9. Generating delays of different time intervals using delay subroutines.
10. To study the interfacing of 7 segment LED display with microprocessor.
11. To study the interfacing of ADC and DAC with microprocessor.
12. To study the interfacing of stepper motor with microprocessor.
13. To study and compare main features of Intel core i3, i5 and i7

CS-412: OPERATING SYSTEM LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	I.A.	ESE	Total	
0	0	2	1	30	20	50	3 hrs

Experiments as per the topics in the syllabus for the course 'Operating System lab' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

List of Experiments:

1. Overview of single user systems, network operating system and multiuser system.
2. User administration in windows and linux operating system.
3. Write a program for the simulation of following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.
   a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
4. Write a program for the simulation of following file allocation strategies.
   a) Sequential b) Indexed c) Linked
5. Write a program for the simulation of following contiguous memory allocation techniques
   a) Worst-fit b) Best-fit c) First-fit
6. Write a program for the simulation of following file organization techniques
   a) Single level directory b) Two level directory c) Hierarchical
7. Write a program for the simulation of Bankers algorithm for the purpose of deadlock avoidance.
8. Write a program for the simulation of following disk scheduling algorithms
   a) FCFS b) SCAN c) C-SCAN
9. Write a program for the simulation of following page replacement algorithms
   a) FIFO b) LRU c) LFU
10. Write a program for the simulation of producer-consumer problem using semaphores.
11. Study the Linux operating system and implement various commands.
12. Write a program do the following:
    a) Find the attribute of file. b) To change the attribute of file. c) Create the directory. d) Delete the directory. e) Create the file. f) Delete the file g) Find the size of Hard Disk, RAM, and VRAM, cache.
12. Study of various viruses / worms and tools.

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SEMESTER-V
CS-501: COMPUTER NETWORKS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts of data communications and to study the functions & protocols of OSI model.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Data communication, networks, Internet, protocols and standards. **Network Models:** Layered tasks, the OSI model, layers in the OSI model, TCP/IP protocol suite, addressing. **PHYSICAL LAYER** **Data & Signals:** Analog & digital, periodic analog signals, digital signals, transmission impairments, data rate limits, performance, multiplexing, spread spectrum. **Transmission Media:** Guided media, unguided media, media comparison **Switching:** Circuit switched networks, datagram networks, virtual circuit networks, structure of a switch.	**10**
II	**DATA LINK LAYER** **Error Detection and Correction:** Introduction, block coding, linear block codes, cyclic codes, checksum. **Data Link Control:** Framing, flow & error control, protocols, noiseless channels, hdlc, point to point protocol. **Multiple Accesses:** Random access, controlled access, channelization. **Wired LANs:** Ethernet: IEEE standards, standard ethernet, changes in the standards, fast ethernet, gigabit ethernet, token bus, token ring, FDDI, comparison.	**10**

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	Wireless LANs: IEEE 802.11, bluetooth, other wireless networks. **Connecting LANs and Virtual LANs:** Connecting devices, backbone networks, virtual LANs	
III	**NETWORK LAYER** **Network Layer Logical Addressing:** Introduction to network layer, IPv4 addresses, IPv6 addresses. **Network Layer Protocols:** Internetworking, IPv4, IPv6, transition from IPv4 to IPv6, address mapping, ICMP, IGMP, ICMPv6, delivery, forwarding, unicast routing protocols, multicast routing protocols	**10**
IV	**TRANSPORT LAYER** **Introduction to Transport Layer:** Process to process delivery, internet transport-layer protocol, user data gram protocol (UDP), TCP, SCTP. **APPLICATION LAYER** **Introduction to Application Layer**: Domain name system, remote logging, electronic mail, file transfer, architecture of WWW, web documents, HTTP, standard client server protocols, network management, SNMP	**9**

Text Books:

1. Forouzan, B.A., "***Data communication and Networking",*** McGraw Hill
2. Tanenbaum, A.S., "***Computer Networks",*** Prentice Hall

Reference Books:

1. Kurose and Ross, "***Computer Networking: A Top Down Approach",*** Addison-Wesley
2. Stallings, W. "***Computer Networking with Internet Protocols and Tech",*** Prentice Hall of India

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CS-502: CORE JAVA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts in Java, gain knowledge in the concepts of methods, packages and applets and build a sample application using Java technologies.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Java:** Features of java, object oriented concepts, data types, variables, arrays, and system class-print(), println(), and printf() methods. Operators: arithmetic operators, bitwise operators, relational operators, boolean logical assignment operators, '?' operator, operator precedence. Control statements: java's selection statements, iteration statements, jump statements	**10**
II	Classes, objects, constructors, overloading method, access control, static and fixed methods, inner classes, string class, inheritance, overriding methods, using super, abstract class, dynamic method dispatch, using 'final' with inheritance.	**10**
III	GUI components, common GUI Event types and listener interfaces J option Pane, J Label, J text field, J button, J check box, J text area, J combo box, J list, J panel, mouse event handling, adapter classes, key event handling	**10**
IV	Layout managers, flow layout, border layout, grid layout, graphics and java 2D, graphics contexts and graphics objects, color control, font control, drawing lines, rectangles and ovals, J slider, using menus with frames. Packages, access protection, importing packages, interfaces, exception handling, throw and throws, thread, synchronization, runnable interface, inter thread communication, multithreading, I/O streams, file streams, applets, introduction to java API packages (java.lang and java.util)	**9**

Text Books:

1. C. Muthu, "***Programming in Java"***, TMH Publication

2. Deitel & Deitel, "***Java How to Program",*** PHI Publication

Reference Books:

1. Herbert Schildt, ***"The Complete Reference Java"***, TMH Publication

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CS-503: COMPUTER GRAPHICS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	2	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts in computer graphics, rules and algorithms in generating graphical outputs and to develop 3-D objects using suitable transformations.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals of computer graphics:** Overview of graphic systems, video display devices, raster and random systems, graphic softwares and standards, applications of computer graphics. **Output primitives:** Points and lines, line drawing algorithms, line function, circle and ellipse generating algorithms, pixel addressing and object geometry, filled area primitives.	6
II	**Two dimensional geometric transformations:** Matrix representation and homogeneous coordinates, composite transformations, reflection and shearing, two dimensional viewing-viewing pipeline, viewing coordinate reference frame, window-to-viewport coordinate transformation, clipping operations- point, line and polygon clipping algorithm.	7
III	**Three dimensional concepts and object representation:** 3D display methods, polygon surfaces and tables, Plane equations, polygon meshes, curved lines and surfaces, quadratic surfaces, spline representations: Bezier curves and surfaces, B-spline curves and surfaces. **Three dimensional transformations and viewing:** 3D geometric and modeling transformations- translation, rotation, scaling, composite transformations, 3D viewing-viewing pipeline and coordinates, projections, clipping, parallel and perspective transformation, visible surface detection methods.	8
IV	**Illumination and Color models:** Basic illumination models-halftone patterns and dithering techniques, properties of light, XYZ, RGB, YIQ and CMY color models. **Computer graphics realism:** Tilling the plane- recursively defined curves- Koch curves-C curves, Dragons- space filling curves- fractals.	5

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Text books:

1. D. Hearn and M.P. Baker, ***"Computer Graphics",*** Prentice Hall of India.

Reference Books:

1. D.Hearn and M.P. Baker, warren Carithers ***"Computer Graphics with OpenGL",*** Pearson Education.
2. Jeffery McConnel, ***"Computer Graphics: Theory into Practice",*** Jones and Bartlett Publishers.

CS-504: ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the representation of agents & agent environment, searching techniques, and various concepts of learning and expert system.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Introduction to artificial intelligence, background and applications, turing test and rational agent approaches, introduction to intelligent agents, their structure, behavior and environment. **Problem Solving and Searching Techniques**: Problem characteristics, production systems, breadth first search, depth first search, heuristics search techniques, best first search, A* algorithm, hill climbing, AND/OR graph AO*, constraint satisfaction problem, means-end analysis, introduction to game playing, min max and alpha beta pruning.	**10**
II	**Knowledge Representation:** introduction to first order predicate logic, well-formed formulas, quantifiers, rule based system, resolution principle, unification, forward reasoning: conflict resolution, backward reasoning , structured knowledge representation. AI programming language: PROLOG: Syntax, procedural and declarative meaning, PROLOG unification mechanism, converting english to PROLOG facts and rules, goals, anonymous variable, lists, use of fail, CUT, NOT	**10**
III	**Introduction to Neural Network:** Hopfield network, single and multilayer networks, perceptions, back-propagations learning, Boltzman machine. Introduction to genetic algorithm: The genetic algorithm, genetic operators, working of genetic algorithm, problem with genetic algorithm.	**10**
IV	**Expert System:** introduction, skill v/s knowledge, characteristics of expert system, knowledge engineering, inferencing, forward chaining and backward chaining expert system tools, applications and future scope Natural language processing: Introduction, language parsing, syntactic and semantic analysis, top down and bottom up parsing, chart parsing, knowledge representation languages, ELIZA, speech recognition	**9**

Text Books:

1. Russell and Norvig, ***"Artificial Intelligence- A Modern Approach"***, Pearson Prentice Hall.

2. D W Patterson, ***"Artificial Intelligence and Expert Systems"***, Prentice Hall of India.
3. B.Vegnanarayana, ***"Artificial neural networks"***, Prentice Halll of India P Ltd

Reference Books:

1. Elaine Rich, Kevin Knight, ***"Shivashankar B. Nair, Artificial Intelligence"***, Tata McGraw Hill.
2. Nils J Nilsson, ***"Artificial Intelligence A New Synthesis"***, Morgan Kaufmann

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CS-505: SOFTWARE ENGINEERING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the software life cycle models, to design and develop correct and robust software products and to understand business requirements pertaining to software development.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Software Evolution:** Need for software engineering, software crisis, generic v/s customer made software product, distinctive characteristics of software product, software development process models (SDLC), waterfall model, prototype model, spiral model. **Software requirement analysis and specification**: Requirement specification, crucial process step, classification of requirements, structured requirement definition, structured analysis & design technique, software prototyping, software requirements specification, nature of the SRS, characteristics of a good SRS, organization of the SRS.	**10**
II	**Software Project Management:** Software project, project feasible study, project planning, project organization, estimate of project effort (COCOMO), staffing level estimation, staffing, risk management, project scheduling, project monitoring and control.	**10**
III	**Software Quality Management:** Quality dimension, process quality and product quality, quality assurance planning, quality measurement, software configuration management, software process improvement, ISO 9000 quality standards, ISO approach to quality assurance systems, SEI capability maturity model (CMM), PSP. **Coding and unit Testing:** Unit testing, non execution based testing, code inspection, testing process, black box testing, white box testing, metric, debugging, program analysis tool, integration testing, system testing, testing distributed implementation, testing of real time system, accepting testing some general issue associated with testing, , recovery testing, security testing, stress testing, performance testing.	**10**
IV	**Software maintenance:** Planning for maintenance, maintenance activities, reengineering, characteristics, potential solution to maintenance problems, s/w maintenance process models. **Software Reuse & Emerging Trends:** S/w reverse engineering, s/w reuse concepts, basic issues in reuse program, reuse approach, client server software, SOA.	**9**

	Fundamentals of Agile: The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software, Development, Agile project management, Design and development practices in Agile projects, Test Driven, Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile, Testing, Agile Tools	

Text Books:

1. Pankaj Jalote, ***"Software Engineering: A Precise Approach"***, Wiley India Publications.
2. S.Thangasamy, ***"Essentials of Software Engineering",*** Wiley India Publications.
3. Agile Software Development with Scrum By Ken Schawber, Mike Beedle Publisher: Pearson
4. Agile Software Development, Principles, Patterns and Practices By Robert C. Martin Publisher: Prentice Hall

Reference Books :

1. Rajib Mall, ***"Fundamental of Software Engineering",*** PHI Publication.
2. K.K. Aggarwal &Yogesh, ***"Software Engineering"",*** New Age International Publishers.

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CS-506: ANALYSIS AND DESIGN OF ALGORITHM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable students to introduce the basic concepts of algorithms, mathematical aspects and analysis of algorithms, sorting and searching of algorithms and various algorithms design methods.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basics of algorithms:** Algorithms and characteristics**,** algorithm design paradigms, fundamentals of algorithmic problem solving, fundamental data structures. **Analysis of algorithms:** The efficient algorithm-average, worst and best case analysis, asymptotic notations and its properties, amortized analysis, recurrences: substitution method, recursion tree method and master's method.	**10**
II	**Divide and conquer:** Binary search, Strassen's matrix multiplication, closest-pair and convex-hull problems. **Sorting Algorithm:** Counting sort, radix sort. **Dynamic Programming:** Overview, difference between dynamic programming and divide and conquer, multistage graphs, optimal binary search trees, knapsack problem, fast fourier transform.	**10**
III	**Greedy Method:** Traveling salesman problem, job sequencing with deadlines, minimum spanning trees (Prim's and Kruskal's algorithms). **Single source Shortest path**: Bellman ford algorithm, single source shortest path in directed acyclic graph. **Approximation Algorithms**: Vertex cover problem, set covering problem , the subset sum problem.	**10**
IV	**Flow networks**: Ford-Fulkerson, maximum bipartite matching, sorting networks, cryptographic, computations, multicast routing, BIN packing. **Computational Complexity:** Polynomial time vs non-polynomial time complexity, polynomial reduction, NP-hard and NP-complete problems, Cook's theorem (without proof).	**9**

Text Books:

1. T.cormen, C. Lieserson. R. Rivest and C. Stein, "***Introduction to Algorithms",*** Prentice-Hall/India.
2. Ellis Horowitz, Sartaz Sahni and Rajasekharan, ***"Fundamentals of Computer Algorithms",*** Galgotia publications pvt. Ltd.

Reference Books:

1. Sara Basse, A.V.Gelder, ***"Computer Algorithms",*** Addision Wesley.
2. Michal T. Goodrich, ***"Älgorithm Design",*** Wiley India Publication.
3. Aho, ullman, and Hopcroft, ***"Design and Analysis of Algorithms",*** Pearson education.

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CS-511: COMPUTER NETWORKS LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Write specifications of latest desktops and laptops.
2. Familiarization with networking components and devices: LAN adapters, hubs, switches, routers etc.
3. Familiarization with transmission media and tools: Co-axial cable, UTP cable, crimping tool, connectors etc.
4. Preparing straight and cross cables.
5. Implementation of various LAN topologies using network devices, cables and computers.
6. Configuration of TCP/IP protocols in Windows and Linux.
7. Implementation of directory/file and printer sharing.
8. Designing and implementing class A, B, C networks
9. Subnet planning and its implementation
10. To plan IPv6 address scheme for a local area network comprising of 'n' terminals.
11. Study different type of classes and bridges, routers, hubs, gateway etc.
12. Configuration a switch, router.

CS-512: CORE JAVA LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Demonstrating the use of methods of math class.
2. Programs to implement the methods of string class
3. To demonstrate interfaces
4. To demonstrate inheritance
5. To demonstrate super and this
6. To demonstrate static variables and methods
7. To demonstrate exceptions
8. To demonstrate file input stream and file output stream classes
9. To demonstrate the creation of applets and passing parameters to applets
10. To demonstrate mouse and keyboard events in an applet
11. To demonstrate the creation of a frame.
12. To demonstrate labels and buttons with proper events
13. To demonstrate checkboxes with proper events
14. To demonstrate check box groups with proper events
15. To demonstrate lists and text fields with proper events
16. To demonstrate scroll bars with proper events
17. To demonstrate menu bars and menus.
18. To demonstrate dialog boxes.

CS-513: COMPUTER GRAPHICS LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Familiarize yourself with creating and storing digital images using scanner and digital camera (compute the size of image when stored in different formats) and convert the stored images from one format to another (BMP, GIF, JPEG, TIFF, PNG, etc.) and analyze them.
2. Implement Bresenham's line algorithm. Also provide Provision to change attributes of graph primitives such as stippling (Dotted and Dashed pattern), colors. Implement Bresenham's circle algorithm. Also provide to change attributes of graph primitives such as stippling (Dotted and Dashed pattern) and colors.
3. Implement 2-D transformation with translation, scaling, rotation, reflection, Shearing and scaling
4. Implement tweening procedure for animation with key frames having equal or different no. of edges.
5. Write a program for 2D line drawing as Raster Graphics Display.
6. Write a program for 2D circle drawing as Raster Graphics Display.
7. Write a program for 2D polygon filling as Raster Graphics Display.
8. Write a program for line clipping.
9. Write a program for polygon clipping.
10. Implement Flood Fill Method to fill interior and exterior of a polygon.
11. Write a program for displaying 3D objects as 2D display using perspectives transformation.
12. Write a program for rotation of a 3D object about arbitrary axis.
13. Write a program to draw different shapes and fill them with various pattern.

CS-514: INDUSTRIAL TRAINING (VIVA-VOCE)

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	0	0	Satisfactory / Unsatisfactory			2Hrs

This 4 weeks training will be related to Industrial Projects to be undertaken under the guidance of Faculty preferably at Industry / Software Park / Incubation Centre or related areas. This may also be undertaken within the Institute. This training will be undertaken during vacation. Student is supposed to submit the project report at the end of the training.

Evaluation will be based on Project Report, presentation and comprehensive Viva-voce examination related to the project.

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OPEN ELECTIVE-III

CS-507: BASICS OF OPERATING SYSTEMS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	0	0	2	40	60	100	3Hrs

COURSE OBJECTIVES:

To learn the functional and operational details of operating system.This course should provide the students with good understanding of Operating System including its architecture and all its components. Good conceptions on all the subjects like processes, scheduling, memory management, file systems, security and protection mechanism etc. should be provided.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**History of Operating Systems:** Zeroth, first, second, third and fourth generations, structure and types of operating system, functions of operating system.	6
II	**Process Management:** States of process, interprocess communication, processor scheduling, threads, CPU scheduling algorithms: first come first serve, shortest job first, round robin scheduling. **File system:** introduction, types of file systems: NTFS, FAT, ext3, ext4, Directory structure and its implementation	7
III	**Memory Management:** Contiguous memory allocation, overlays, fixed partitioning vs. variable partitioning, paged memory, segmentation and virtual memory, page replacement algorithms.	7
IV	**Protection and security:** Introduction to protection, Security attacks, security mechanisms and policies, computer worms, computer viruses, different types of virus.	6

Text Books:

1. Silberschatz A, Galvin P.B. and Gagne G., ***"Operating System Concepts"***, John Wiley.
2. Stallings Willam, ***"Operating Systems Internals and Design Principles"***, Prentice Hall.

Reference Books:

1. Achyut S Godbole "***Operating Systems", Tata McGraw Hill***.

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2. Stallings, Willam, "***Operating Systems Internals and Design Principles",*** Prentice Hall.

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CS-508: PC MAINTENANCE & TROUBLESHOOTING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	0	0	2	40	60	100	3Hrs

COURSE OBJECTIVE:

To learn the functional and operational details of various peripheral devices.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Peripheral Devices:** Overview and Technical Specification: Keyboard, Display Devices, Printers, Magnetic Storage Devices, FDD, HDD, Special Types of Disk Drives, Mouse and Trackball, Modem, Fax, CD ROM Drive, Scanner, Digital Camera, DVD.	6
II	**PC Hardware Overview:** Introduction – Hardware BIOS, DOS Interaction, The PC family, PC hardware, Inside the System Box, Types of Motherboard, Peripheral Interfaces and Controllers on Mother board, Keyboard Interface, CRT Display interface, FDC, HDC. Connectors and Ports of various given computer peripherals and components with their technical specifications Display Devices, SMPS, RAM, CD ROM drive, hard disk, keyboard and mouse, Lan Card, VGA /AGP Card, Printers and Scanners	7
III	**Installation and Preventive Maintenance:** Introduction, system configuration, pre installation planning of operating system, Installation practice, routine checks, PC Assembling and integration, BIOS setup, Engineering versions and compatibility, preventive maintenance, DOS, Virus, Data Recovery.	6
IV	**Troubleshooting: Introduction:** computer faults, Nature of faults, Types of faults, Diagnostic programs and tools, Microprocessor and Firmware, Systematic Troubleshooting, Symptoms observation and analysis, fault diagnosis, fault rectification, Troubleshooting levels – FDD, HDD, CD ROM Problems. Basic troubleshooting using beep Sound, by checking various supply voltages of SMPS. Overview of device Manager, Disk Management, Drive Properties and Folder Properties, Backup & Restore.	7

Text Books:

1. B. Govindarajalu, ***"IBM PC Clones Hardware, Troubleshooting and Maintenance",*** 2/E, TMH.
2. Mark Mines, ***"Complete PC upgrade & maintenance guide",*** BPB publ.

Reference Books:

1. Craig Zacker& John Rouske, ***"PC Hardware: The complete reference"***, TMH.
2. Scott Mueller, ***"Upgrading and Repairing PCs",*** PHI.

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IT-501: MANAGEMENT OF INFORMATION SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	0	0	2	40	60	100	3Hrs

COURSE OBJECTIVE:

The objective of this course is to introduce the students to the management information systems and its application in organizations. The course would expose the students to the managerial issues relating to information systems and help them identify and evaluate various options in management information systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to MIS:** Meaning and role of MIS, definition of MIS, system approach to MIS, MIS organization within a company, importance of MIS, modern organization, role of internet. **Concepts of management information systems:** Data and information, information as a resource, information in organizational functions, types of information systems, decision making with MIS.	7
II	**MIS planning:** General business planning, appropriate MIS response, general MIS planning. **Conceptual design of MIS:** Definition of the problem, system objective and system constraints, analysis of information source, conceptual system design document.	7
III	**Management information systems:** Challenges of managing the IT function, vendor management, IT governance. **Information technology infrastructure and choices:** What is the IT infrastructure? **Infrastructure components:** Hardware, software, networks, enterprise systems, IT outsourcing. Managing data resources, business process integration and enterprise system.	6
IV	**Managing Data Resources:** The need for data management, challenge of data management, database concepts, database design, elements of database, data warehouses. ICT for development, type of ICT interventions, example of ICT for development project, E-governance concept, E-participation.	6

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Text Books:

1. RAHUL DE, ***"Management Information Systems in Business",*** Wiley India Publications.
2. Murdick, Ross & Claggett ***"Information system for modem management",*** Prentice-Hall of India.

Reference Book:

1. S. Sadagopan ***"Management Information Systems",*** Prentice-Hall of India.

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SEMESTER-VI

CS-601: ADVANCED JAVA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the advanced java concepts, java applets, java beans, and swing programming. To learn various animation techniques and advanced networking concepts.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to java Programming:** History of java, characteristics of java, the java environment – JVM, JDK & JRE, different versions of java, OOP principles, comparison of java with C and C++. Language Fundamentals.	10
II	**GUI Components (AWT & SWING) :** GUI concepts in java, basic GUI components in AWT, container classes, layout managers, flow layout, border layout, card layout, box Layout. **SWING:** Difference between AWT and SWING, java foundation classes-javax, swing and model view controller, creating a Frame in Swing, displaying image in swing, J component class methods, creating components in swing, writing GUI programs in java (with AWT or SWING), event handling, handling keyboard events and mouse events.	10
III	**SERVLETS:** The life cycle of a servlet, a simple servlet, the servlet API, servlet package, reading servlet parameters, handling HTTP requests and responses, java server pages-introduction to java server pages, a simple JSP example, scripting.	10
IV	**JDBC:** JDBC architecture. JDBC-ODBC relationship, types of JDBC drivers, JDBC components, JDBC interfaces and classes, steps for querying the database with JDBC, creating an ODBC data source, querying and updating database tables, passing parameters to a statement.	9

Text Book:

1. Schildt Herbert, "***Java: The Complete Reference",*** Tata McGraw-Hill.
2. E Balagurusamy***, "Programming with java A Primer Fourth Edition".***

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Reference Books:

1. Deitel & Deitel, "***Java How to Program",*** Pearson Education Asia.
2. Rao Nageswara , "***Core Java: An Integrated Approach",*** Dreamtech Press.

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CS-602: DISTRIBUTED OPERATING SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

This subject provides students with an in-depth knowledge about the operating system. It covers the distributed operating system in detail, including inter process communication, synchronization, shared memory and distributed file system.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Introduction to network operating system and distributed operating system, issues in the design of distributed operating systems, overview of computer networks. inter process communication, linux, IPC mechanism, remote procedure calls, RPC exception handling, security issues, RPC in heterogeneous environment (case study linux RPC)	**10**
II	**Synchronization in Distributed Systems:** Clock synchronization-logical and physical clocks, clock synchronization algorithms, mutual exclusion, election algorithms, deadlocks in distributed systems, thrashing, heterogeneous DSM, resource management (load balancing and load sharing approach), process management–process migration, thread.	**10**
III	**Distributed Shared Memory:** Introduction to shared memory, consistency model, page based distributed shared memory, shared variable distributed memory, object based distributed memory.	**10**
IV	**Distributed File System:** File models, file access, file sharing, file caching, file replication, fault tolerance, network file system, security in distributed file system.	**9**

Text Books:

1. Tanenbaum A, ***"Distributed Operating System"***, PHI

Reference Books:

1. A. Silberschatz, P.B. Galvin, "***Operating System Concepts",*** John Wiley and Sons (Asia).

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CS-603: COMPILER DESIGN

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic principles of compiler, compiler construction tools, context free grammars and various parsing techniques.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to compliers:** A simple traditional modular compiler, compiler architecture, frontend and backend of compiler, compiler writing tools, properties of good compiler, translators, types of compilers, bootstrapping, regular expressions, finite automata, closure algorithm.	**10**
II	**Parsing:** Context free grammar, derivation & parse trees, bottom-up parsers: shift reduce, operator precedence, top-down parsers: prediction and backtracking, recursive decent and predictive parser, efficient parsers; LR parsers: LR(0), SLR, LALR, implementation of parsers	**10**
III	**Syntax Directed Translation:** Syntax directed program evaluation, different schemes &implementation, immediate code generation, syntax-trees, three address code generation, quadruples triple, translation of assignment statements. **Code Optimization:** Sources of optimization, optimizing transformations: compile time evaluation, common sub expression elimination, dead code elimination, loop optimization, strength reduction, DAG representation of basic blocks, value number & algebraic laws, global data-flow analysis, dominators, reducible flow graphs.	**10**
IV	**Code Generation:** Major tasks, issues in designing code generators, object programs, basic blocks and flow graphs, a simple code generator, register allocation & assignment code generation from DAG's., peephole optimization.	**9**

Text Books:

1. Alfred V. Aho, J.D. Ullman , ***"Principles of Compiler",*** Narosa Publishing Design.
2. Rajesh K. Maurya, ***"Compiler Design",*** Dreamtech Press.

Reference Book:

1. D.M. Dhamdhere , ***"Compiler Construction",*** Macmillan India Ltd.

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CS-604: LINUX ADMINISTRATION

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	2	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to provide general introduction to Linux server, imparting knowledge on user administration and to give an introduction to process and shell programming.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Installing Linux as a Server:** Linux distributions, open source software and GNU, difference between windows and linux, installing linux in a server configuration, GNOME and KDE- X windows system, managing software. **Linux Administration:** Managing users, user text files-user management tools, command line, boot loaders, file systems, compiling linux kernel, linux security.	7
II	**Internet Services:** DNS, FTP-Mechanics-installing and customizing the server, setting up web server using apache, SMTP- install, configure and run postfix server, POP and IMAP, SSH- public key cryptography, creating a secure tunnel.	6
III	**Intranet Services:** NFS- enable and configure NFS server and client, NIS- configuring master and secondary NIS server and client, NIS tools, SAMBA-administration, printing-install cups-add and manage print jobs, DHCP, virtualization.	6
IV	**Linux Process Control:** Linux process environment, login processes, parent child relationship, process variable, process monitoring, invoking foreground and background processes, terminating process, daemons. **Shell Programming:** Introduction, shell scripts, executing shell scripts, creating scripts, simple examples.	7

Following practicals are to be performed in tutorials:

1. Installation Linux operating system.
2. To study basic Linux Commands.
3. To study and create various types of files in linux.
4. To study vi and vim editors
5. To study user, group, owner and access permissions of a file.

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6. Study of Bash shell, Bourne shell and C shell in linux operating system
7. Study Shell scripting in Linux.
8. To study various filters in Linux.
9. Administration of LINUX Operating System.
10. Introduction to variables in shell scripting.
11. Introduction of various constructs in shell scripting.
12. Write the program to mount the various devices (i.e. floppy, CD-Rom etc).
13. To study Process synchronization.

Textbooks:

1. Wale Soyinka, ***"Linux Administration A Beginners Guide",*** Tata McGraw Hill.
2. Mc Kinnon, ***"Installing and Administrating Linux",*** Wiley.

Reference Books:

1. Richard Peterson, ***"Linux: The complete Reference",*** Tata McGraw Hill.
2. Mark G. Sobell, ***"Practical Guide to Fedora and Red Hat Enterprise Linux",*** Prentice Hall.
3. www.linuxhomenetworking.com
4. www.linux.org
5. www.linux.com

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CS-605: DATA MINING & DATA WAREHOUSING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts of data mining and its functionalities, obtain knowledge in different data mining techniques and algorithms and to go through various application domains of data mining.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Data warehousing:** Definition, data warehouse users, 3- Tier data warehouse architecture, data warehouse features: subject oriented data, integrated data, time variant data, nonvolatile data, data granularity. **Data warehouse process & architecture:** Introduction, characteristics of data warehouse architecture, goals, OLTP vs. OLAP, OLAP in the data warehouse, types of OLAP servers (MOLAP, ROLAP and HOLAP), distributed and virtual data warehouses, infrastructure as the foundation for data warehousing, data ware house security, backup and recovery.	10
II	**DW tools and technologies:** Reporting and query tools, the need for applications, extraction, cleansing and transformation tools, DW admin and management tools, data marts-reasons and issues. **Data warehouse schema:** Dimensional modeling, the star schema, the snowflake schema, aggregate tables, data warehouse and the data model. **Data Warehousing Design:** Designing, dimensionality modeling, design methodology, data warehousing and web, DW design using Oracle, data warehouse development, testing, growth and maintenance.	10
III	**Data mining:** Basics & tasks, data mining user's perspective, other issue, foundation of data mining, measuring data mining effectiveness, data mining architecture, the knowledge discovery process, integrating data mining with data warehousing, KDD vs. data mining, DBMS vs. data mining. **Frequent pattern mining:** Mining associate rule, application, variation, FIM, optimal FIM algorithm, incremental mining, and sequential rule.	10

	Data mining techniques: Clustering techniques, decision tree, clustering analysis, case-based reasoning, genetic algorithms, knowledge discovery through neural networks & generic algorithm, rough sets, support victor machines and fuzzy techniques.	
IV	**Moving into Data mining:** Relational data, transactional data, and multi-dimensional data, data stream, application of data mining, web mining, text mining, temporal data mining, sequence mining, time series analysis, spatial data mining, issue and challenges in data mining, current trends in data mining. **Mining Complex data objects:** Multimedia databases, time series and sequence data, mining text databases and mining world wide web.	**9**

Text Books:

1. Paulraj Ponniah , ***"Data warehousing Fundamentals",*** India Edition.
2. ReemaThareja***, "Data warehousing"*** , Oxford University press.
3. Jiawei Han &Micheline Kamber ,Morgan Kaufmann ***,"Data Mining concepts & Techniques"*** .

Reference Book:

1. Pudi, ***"Data Mining"***, Oxford University press.
2. Arun Pujari , ***"Data Mining Techniques***", University Press; Hyderabad .
3. Alex Berson***, "Data Warehousing , Data Mining and OLAP"***,, McGraw Hill
4. Mallach, ***"Data Warehousing System",*** McGraw Hill
5. W.H. Longhman, C.Klelly, ***"Managing the Data Warehouses***", John Wiley & Sons.
6. Miner, RandallMatignon,***"Data Mining using SAS Enterprise",*** Willey India Edition.
7. Ravindernath, B ***, "Decision support Systems & Data Warehouses"***, New Age International Publishers, New Delhi.

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CS-606: MODELING & SIMULATION

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to provide a strong foundation on concepts of simulation and modeling, understand the techniques of random number generation, understand the techniques of testing randomness, practice on simulation tools and impart knowledge on building simulation systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals** Definition and reasons for simulation, continuous (time-oriented) and discrete (event) systems, modeling/programming simple deterministic systems, rates and system dynamics.	9
II	**Concepts in Simulation** Stochastic variables; discrete vs continuous probability, Monte Carlo Simulations; Monte Carlo methods, normally distributed random numbers, Monte Carlo V/S Stochastic Simulations.	10
III	**Queuing Models** Single server queuing system, introduction to arrival and departure time, flowcharts for arrival and departure routine, event graphs of queuing model, determining the events and variables, event graphs for inventory model. Random Numbers: Introduction to Random Numbers, importance of random numbers in simulation, mid-square random number generator, residue method, arithmetic congruential generator, testing numbers for randomness, Chi-Square test.	10
IV	**Discrete Event System Simulation** Discrete events, representation of time, queues and servers, generation of arrival patterns, resource seizing, departures simulation of a telephone system and computer networks, simulating components of an operating system, delayed calls; modeling policies, priority queues, tasks, gathering statistics, counters and summary statistics, measuring utilization and occupancy, recording distributions and transit times. **Introduction to a Simulation Languages** Simulation in C++, GPSS/ MATLAB/Network Simulators.	10

Text Books:

1. Law and Kelton, ***"Simulation Modeling and Analysis",*** McGraw-Hill.

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2. J. Banks, J. Carson and B. Nelson***, "Discrete-Event System Simulation",*** Prentice-Hall.
3. Deo, Narsing, ***"System Simulation with Digital Computers"***, PHI.
4. D.S Hira, ***"System Simulation"*** S.Chand publication.

Reference Books:

1. K.A. Dunning ***"Getting Started in GPSS"***, Engineering Press, San Jose, CA.
2. P. Fishwick, ***"Simulation Model Design and Execution",*** Prentice-Hall.

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CS-611: ADVANCED JAVA LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Write a JAVA servlet program to implement a dynamic HTML using Servlet (user name and Password should be accepted using HTML and displayed using a servlet).
2. Write a JAVA servlet program to auto web page refresh (consider a webpage which is displaying date and time or stock market status. For all such type of pages, you would need to refresh your web page regularly; java servlet makes this job easy by providing refresh automatically after a given interval).
3. Write a JAVA servlet program to implement and demonstrate get() and post methods (using HTTP servlet class).
4. Write a JAVA servlet program using cookies to remember user preferences.
5. Write a JAVA jsp program to implement verification of a particular user login and display a welcome page.
6. Write a JSP program to demonstrate the import attribute.
7. Write a program to develop a swing application with different layouts.
8. Write a program to create a menu-based application using swing which opens a file dialog box and allows user to select a file from local hard drives. Display name of a file selected into textbox and create an executable jar file for this application.
9. Write a program to create the user interface for the text editor application and implement some functions. (using SWING classes)
10. Write an application that finds out all the loaded JDBC compliant drivers and their details.
11. Write a database application that is JDBC driver and data source independent.
12. Write an application that finds out number of records, no. of columns and types of the columns within a table.

CS-612: MODELING & SIMULATION LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Write a program for the random number generation and perform its testing and validation for various discrete and random variables.
2. Perform modeling and simulation of queuing system (i.e. in computer system).
3. Perform modeling and simulation of the ATC (Air Traffic Control System).
4. Perform modeling and simulation of the Monte-Carlo method.
5. Study the GPSS and implement various program in it.
6. Introduction to MATLAB and implementation of Branching statements.
7. Loops and functions in MATLAB.
8. Plots and Arrays in MATLAB.
9. Introduction regarding usage of any Network Simulator.
10. Practical Implementation of Queuing Models using C/C++.

CS-613: SEMINAR

Evaluation Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Evaluation
L	T	P/D	C	Sessional	End Semester Evaluation/ Viva	Total	
0	0	2	1	50	50	100	-

PROCEDURE:

Individual students should be asked to choose a topic in any field of computer science engineering, preferably from outside the B.Tech syllabus and give a seminar on that topic for about thirty minutes. It enables the students to gain knowledge in any of the technically relevant current topics and acquire the confidence in presenting the topic. The student will undertake a detailed study on the chosen topic under the supervision of a faculty member, by referring papers published in reputed journals and conferences. Each student has to submit a seminar report (in two copies), based on these papers; the report must not be reproduction of any original paper. A committee consisting of three/four faculty members (preferably specialized in various sub-fields of Computer Science Engineering) will evaluate the seminar. One of the two copies submitted by the student should be returned to him/her after duly certifying it by the staff in charge of the seminar and Head of the department and the other copy shall be kept in the departmental library.

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IT-601: MANAGEMENT INFORMATION SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The objective of this course is to introduce the students to the management information systems and its application in organizations. The course would expose the students to the managerial issues relating to information systems and help them identify and evaluate various options in management information systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to MIS:** Meaning and role of MIS. Definition of MIS, System approach to MIS, MIS organization within a company. Importance of MIS, Modern organization, role of internet, managing internet era, challenge for manager. **Concepts of Management Information Systems:** Data and Information, Information as a Resource, Information in Organizational Functions, Types of Information Systems, Decision Making with MIS, Communication in organizations.	**10**
II	**MIS Planning:** General business planning, Appropriate MIS response, MIS Planning: General, MIS Planning: Details. **Conceptual Design of MIS:** Definition of the problem, System objective and system constraints, Analysis of information source, Conceptual system design document. Information system and Managing Strategy.	**10**
III	**Management Information Systems:** Challenges of Managing the IT Function, Vendor Management, IT Governance. **Information Technology Infrastructure and Choices:** What is the IT Infrastructure? **Infrastructure Components:** Hardware, software, Networks, Solutions: Cloud Computing, Virtualization, Enterprise Systems, IT Outsourcing. Managing data resources, Business process integration and enterprise system.	**10**
IV	**Managing Data Resources:** The need for Data Management, Challenge of Data Management, Database Concepts, Database Design, Elements of Database, Data Warehouses. ICT for development, Type of ICT interventions, Example of ICT for development project, E governance concept, E-participation, The society of the internet, Open source software.	**9**

Text Books:

1. Gordon B Davis, Margrethe H Olson, ***"Management Information System"***, TMH
2. Rahul De, ***"Management Information Systems in Business",*** Wiley India Publications.

3. Murdick, Ross &Claggett, ***"Information System for Modern Management",*** Prentice-Hall of India.

Reference Book:

1. S. Sadagopan, ***"Management Information Systems",*** Prentice-Hall of India.

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IT-602: ENTERPRISE RESOURCE PLANNIG

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

This course examines the evolution and implementation of ERP systems. It also covers the types of issues that manager will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to ERP:** Integrated management information seamless integration, supply chain management, integrated data model, benefits of ERP, definition of business engineering, business engineering and ERP, principle of business engineering, business engineering with information technology.	**10**
II	**Business Modeling for ERP:** Building the business model, ERP implementation, an overview of role of consultant, vendors and users, customization, precautions, ERP post implementation options, ERP implementation technology, guidelines for ERP implementation.	**10**
III	**ERP and Competitive Advantage:** ERP domain MPGPRO, IFS/Avalon, industrial and financial systems, Baan IV SAP, market dynamics and dynamic strategy.	**10**
IV	**Commercial ERP:** Description, multi-client server solution, open technology, user interface, application integration. **VSAP Architecture:** Basic architectural concepts, the system control interfaces, services, presentation interface, and database interface.	**9**

Text Books:

1. Bret Wagner, Ellen Monk, ***"Enterprise Resource Planning",*** Course Tech.
2. Alexis Leon***, "Enterprise Resource Planning",*** Tata McGraw Hill.

Reference Books:

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1. Vinod Kumar Garg and N.K. Venkita Krishnan, ***"Enterprise Resource Planning – Concepts and Practice"***, PHI.
2. Jose Antonio Fernandz, ***"The SAP R/3 Handbook",*** TMH.

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IT-603: MUTIMEDIA TECHNOLOGY

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to adapt the architecture for design of multimedia system and standards used in developing multimedia applications.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introductory concepts:** Basic definitions, components of multimedia system, uses of multimedia, introduction of making multimedia-the stages of the project, the requirements to make a good multimedia, multimedia skills and training, motivation for multimedia usage, frequency domain analysis, application domain and ODA. Multimedia software- basic tools, making instant multimedia, multimedia software and authoring tools, production standards.	**10**
II	**Multimedia building blocks**- Text, sound, images, animation and video, digitization of audio and video objects, different compression algorithms concern to text, audio, video and images, working exposure on tools like dream weaver, 3D effects, flash etc.	**10**
III	**Multimedia and the Internet:** History, Internet working, connections, Internet services, the world wide web, tools for WWW–web servers, web browsers, web page makers and editors. Multimedia applications–Media communication, media consumption, media entertainment, media games.	**10**
IV	**Synchronization:** Temporal relationships, synchronization accuracy, specification factors, quality of service(QoS), multimedia-looking towards future: digital communication and new media, interactive television, digital broadcasting, digital radio, multimedia conferencing	**9**

Text Books:

1. Steve Heath, ***"Multimedia and Communication Systems",*** Focal Press, UK.
2. Tay Vaughan, ***"Multimeia: Making it Work",***TMH.
3. K. Andleigh and K. Thakkar, ***"Multimedia System Design",*** PHI, PTR.

Reference Books:

1. Keyes, ***" Multimedia Handbook",*** TMH.

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2. Ralf Steinmetz and Klara Naharstedt, ***"Multimedia: Computing, Communications and Applications",*** Pearson.
3. Steve Rimmer. ***"Advanced Multimedia Programming",*** MHI.

SEMESTER VII

CS-701: ADVANCE COMPUTER ARCHITECTURE

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

With increase in availability of system resources, concept of parallel architecture has obtained immense popularity. This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**The State of Computing:** System attributes to performance, multiprocessors and multicomputer, shared memory and distributed memory, taxonomy of MIMD computers, multivector and SIMD computers, PRAM and VLSI models. **Parallelism:** Data and resource dependencies, hardware and software dependencies; program partitioning and scheduling: grain sizes and latency, grain packaging and scheduling; program flow mechanism: control flow versus data flow, demand driven mechanism, comparisons of flow mechanisms; system interconnect architectures: network properties and routing, static connection networks.	**10**
II	**Performance Metrics and Measures:** Parallelism profile in programs, harmonic mean performance, efficiency, utilization and quality, standard performance measures, speedup performance law: Amdahl's law for a fixed workload, Gustafson's law for scaled problems, scalability analysis and approaches, scalability metrics and goals, evolution of scalable computers. **Advance Processor Technology:** Design space of processors, instruction set architecture, CISC and RISC scalar processors; superscalar and vector processors: superscalar processors, the VLIW architecture, vector and symbolic processors; memory hierarchy technology: hierarchical memory technology, inclusion, coherence and locality, memory capacity planning.	**10**
III	**Multiprocessor System Interconnects:** Hierarchical bus system, crossbar switch and, multiport memory, multistage and combining networks; cache coherence and synchronization mechanism, the cache coherence problem, snoopy bus protocol, directory	**10**

	based protocols, hardware synchronization mechanisms. **Vector Processing principles:** Vector instruction types, vector access memory schemes. **Multivector Multiprocessors:** Performance directed design rules, Cray Y – MP, C-90 and MPP, SIMD computer organization: implementation models, the CM-2 architecture, introduction to multicore architecture	
IV	**Parallel Programming Models:** Shared variable model, message passing model, data parallel model, object oriented model, function and logic models. **Parallel Language and Compilers:** Language feature for parallelism, parallel language constructs, optimizing compiler for parallelism. **Parallel Programming Environment:** Software tools and environment, Y-MP, Pargon and CM-5 environment, visualization and performance testing. **Synchronization and Multiprocessing Modes:** Principles of synchronization, multiprocessor execution models, shared-variable program structures, locks for protected access, semaphores and applications, monitors and application, message-passing program development, distributing the computation, synchronous message passing, asynchronous message passing. **Mapping Programs on to Multicomputer:** Domain decomposition techniques, control decomposition techniques, heterogeneous processing.	**9**

Text Books:

1. Kai Hawang: ***"Advance Computer Architecture – Parallelism, Scalability and Programmability"***, McGraw Hill International Edition.
2. Michael J. Quinn, ***"Parallel Computing – Theory and Practice",*** McGraw Hill International.

Reference Books:

1. Sima, ***"Advance Computer Architecture : A Design Space Approach",*** Pearson Publication.
2. Kain ***"Advance computer architecture",*** PHI publication.
3. S. G. Akl, ***"Design and Analysis of parallel algorithms" ,***Prentice Hall, Englewood Cliff NJ.
4. S.K. Ghosal, ***"A practical approach to parallel Computing"***, University press (India) Ltd.

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CS-702: WIRELESS & MOBILE COMPUTING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	2	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

To enable the students to synthesis and analyze wireless and mobile cellular communication systems, understanding the concept of GSM, different network components and wireless adhoc networks in detail.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	Mobile communication, mobile computing, mobile computing architecture, mobile devices, mobile system network, mobility management, GSM services and architecture, radio interfaces of GSM, protocols of GSM, 2G,3G,4G	7
II	Cellular network and frequency reuse, handheld device, limitation of mobile device, wireless switching technology, wireless communication problem, wireless network reference model, wireless networking issue, wireless network standards, wireless body area network architecture and component, design issue, network protocols, WBAN technologies. Mobile IP network layer: IP and mobile IP network layer, packet delivery and handover management, tunneling and encapsulation.	8
III	Network components, design requirements of WLAN, network architecture, WLAN standards, WLAN protocols, IEEE 802.11p, WLAN applications, WMAN network architecture, network protocols, broadband wireless networks, WMAN applications.	6
IV	Wireless Ad Hoc networks, mobiles Ad Hoc networks (MANET), routing protocols of MANET, wireless sensor networks, wireless mesh networks, vehicular Ad Hoc networks (VANETs).	5

Following practicals are to be performed in tutorials:

1. Getting in Touch: Basics of WSN programming using TinyOS.
2. Gathering Data: Sensing data using WSN motes.
3. To implement code division multiple acces (CDMA).
4. To study frequency reuse.
5. To study Choice Group class and its implementation in J2ME.
6. To study Canvas class and its implementation in J2ME.
7. Write WML page using various tags such as select and option tags.
8. Write a WML page to display an image and to accept input from the user.
9. Study Assignment: Detailed study of Bluetooth.

Text Books:

1. Manvi & Kakkasageri , ***"Wireless and Mobile networks",*** Wiley India Publication.

2. Raj Kamal , ***"Mobile Computing",*** Oxford university press.
3. Sandeep K. S. Gupta, Frank Adelstein, Golden G. Richard III, Loren Schwiebert, ***"Fundamentals of Mobile and Pervasive Computing"***, TMH
4. D P Aggarwal, "***Introduction to Wireless and Mobile Systems",*** Cengage Learning

Reference Books:

1. Theodore S. Rappaport , ***"Wireless Communication"*** , Pearsons.
2. W.C.Y.Lee , ***"Mobile Cellular Telecommunication",*** McGraw Hill.
3. W. Stallings, ***"Wireless Communications and Network",*** Pearson Education

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CS-703: INFORMATION SECURITY

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to know the methods of conventional encryption, public key encryption, number theory. Understanding hash functions and various network security tools.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Importance of information system:** Basic of information system, security goals, techniques for security goal implementation. **Mathematical Background for Cryptography**: Modular arithmetic, greatest common divisor, Euclidean algorithm, computing the inverse, extended Euclidean algorithm, Fermat's theorem, Euler totient function. Role of cryptography in information security, plain text, cipher text, key, encryption, decryption, Kerckhoff's principle. substitution ciphers, transposition ciphers, types of attacks on ciphers	**10**
II	**Introduction to Ciphers:** Monoalphabetic and polyalphabetic ciphers, perfect substitution cipher such as the vernam cipher, stream and block cipher, confusion and diffusion, unicity distance. **Cryptanalysis:** Introduction of cryptanalysis, cryptanalysis of monoalphabetic ciphers such as affine cipher, cryptanalysis of polyalphabetic ciphers such as vigenere cipher	**10**
III	**Public key(Asymmetric key) Encryption Systems**: Concept and characteristics of public key encryption system, introduction to Merkle-Hellman knapsacks, Rivest–Shamir-Adlman (RSA) encryption. **Digital Signature**: Introduction to digital signature algorithms, RSA digital signature scheme algorithm, the digital signature standard (DSA).	**10**
IV	**Secure Secret Key (Symmetric) Systems:** The data encryption standard (DES), introduction to advance encryption standard (AES). **Law and legal Framework**: Information security and law, understanding the law for information security, the Indian IT act, patent law, copyright law, Indian copyright law, privacy on internet, privacy consideration in web services, ethical issue owing to information warfare, cryptographic tools and ethical issues, understanding ethical hacking,	**9**

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	social engineering issue, ethical domain for information security.	

Text Books:

1. Behrouz A Farouzan , ***"Cryptography and N/W Security",*** McGraw Hill.
2. Charles P.Pfleeger, ***"Security in Computing",*** Prentice Hall International, Inc.

Reference Books:

1. Nina Godbole***, "Information System security"***, Wiley India Publication
2. Eric Cole & Ronald Krutz, ***"Network Security bible"*** , Wiley India Publication.
3. Patel ***, "Information security"***, PHI publication.
4. C K Shyamala & N Harini, ***"Cryptography and Security"*** , Wiley India publication
5. William Stallings, ***"Cryptography and N/W Security",*** Pearson.

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CS-704: CLOUD COMPUTING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts in cloud, migration to cloud, enterprise cloud and security aspects in cloud.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Cloud Computing:** Online social networks and applications, cloud introduction and overview, different clouds, risks, novel applications of cloud computing. **Cloud Computing Architecture:** Introduction cloud computing architecture, on demand computing virtualization at the infrastructure level, CPU virtualization, discussion on hypervisors storage virtualization, the SPI framework for cloud computing, the cloud services delivery model	**10**
II	**Cloud Deployment Models:** Key drivers to adopting the cloud, the impact of cloud computing on users, governance in the cloud, barriers to cloud computing adoption in the enterprise. **Security Issues in Cloud Computing:** Security in cloud computing environment, infrastructure security: the network level, the host level, the application level, data security and storage, aspects of data security, data security mitigation provider data and its security	**10**
III	**Identity and Access Management:** Trust boundaries and IAM, IAM challenges, relevant IAM standards and protocols for cloud services, IAM practices in the cloud, cloud authorization management. **Security Management in the Cloud:** Security management standards, security management in the cloud, availability management: SaaS, PaaS, IaaS	**10**
IV	**Privacy Issues:** Privacy issues, data life cycle, key privacy concerns in the cloud, protecting privacy, changes to privacy risk management and compliance in relation to cloud computing, legal and regulatory implications, U.S. laws and regulations, international laws and regulations. **Audit and Compliance:** Internal policy compliance, governance, risk, and compliance (GRC), regulatory/external compliance, cloud security alliance, auditing the cloud for compliance, security as a cloud.	**9**

Text Books:

1. John Rhoton **,** ***"Cloud Computing Explained",*** Implementation Handbook for Enterprises.

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2. Tim Mather, ***"Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance",*** (Theory in Practice), ISBN-10: 0596802765,O'Reilly Media
3. ***"Cloud Application Architectures: Building Applications and Infrastructure in the Cloud"***, Publisher: O'Reilly Media; ISBN-10: 0596156367, ISBN-13: 978-0596156367

Reference Books:

1. Barrie Sosinsky, ***"Cloud Computing Bible",*** Wiley Publication, ISBN-10: 0470903562
2. Timothy Chou***, "Introduction to Cloud Computing".***

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CS-711: CLOUD COMPUTING LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Introduction to cloud computing.
2. Creating a Warehouse Application in Sales Force.com
3. Creating an Application in SalesForce.com using Apex programming Language.
4. Implementation of SOAP Web services in C#/JAVA Applications.
5. Implementation of Para-Virtualization using VM Ware‘s Workstation/ Oracle‘s Virtual Box and Guest O.S.
6. Installation and Configuration of Hadoop.
7. Create an application (Ex: Word Count) using Hadoop Map/Reduce.
8. Case Study: PAAS(Facebook, Google App Engine)
9. Case Study: Amazon Web Services.

CS-712: PROJECT WORK - I

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	4	2	50	50	100	2Hrs

This project work shall be carried out by the students during the entire semester under the guidance of Supervisor allotted by the institute and its viva will be conducted at the end of the semester.

Project Evaluation will consist of Three parts:
1. Evaluation of the project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous evaluation by internal examiner 30% marks.
2. Viva-voce examination (20% marks).
3. Software evaluation with test runs (10% marks)

Viva-voce examination will be related to the projects executed by the candidate during the course of the semester.

Aim of this Project:
Aim of this project is to equip students in the methodology of the system analysis and design of a live project in the institution in which he/she is studying or in a place of work such as bank, school, college and office in the vicinity of the institute.
This will be a guided project under the close supervision of the faculty of the institute. Projects should be presented in the form of a project report giving a candidate system for solving a live problem.

CS-713: INDUSTRIAL TRAINING (VIVA-VOCE)

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	0	2	50	50	100	2Hrs

This 6 weeks training will be related to Industrial Projects to be undertaken under the guidance of Faculty preferably at Industry / Software Park / Incubation Centre or related areas. This training will be undertaken during vacation. Student is supposed to submit the project report at the end of the training.

Evaluation will be based on Project Report, source code in CD, presentation and comprehensive Viva-voce examination related to the project.

IT-701: BIG DATA ANALYTICS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course aims to help students to understand what big data analytics is, different data analytics methods, analyze the requirements for the big data analytics system for any organization , formulate an effective strategy to implement a successful data analytics project.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Big Data:** Introduction to bigdata platform, traits of big data, challenges of conventional systems, web data, evolution of analytic scalability, analysis vs reporting, statistical concepts: sampling distributions, re-sampling, statistical inference, prediction error. **Basic Data Analysis and Data Analytic Methods Using R:** Regression modelling, multivariate analysis, bayesian modelling, inference and bayesian networks, support vector and kernel methods, analysis of time series: linear systems analysis, nonlinear dynamics, rule induction, neural networks: learning and generalization, competitive learning, principal component analysis and neural networks, fuzzy logic: extracting fuzzy models from data fuzzy decision trees.	**10**
II	**Frequent Itemsets and Clustering:** Mining frequent itemsets, market based model, Apriori algorithm, handling large data sets in main memory, limited pass algorithm, counting frequent itemsets in a stream, clustering techniques: hierarchical, k-means, frequent pattern based clustering methods.	**10**
III	**Mining Data Streams:** Introduction to streams concepts: stream data model and architecture, stream computing, sampling data in a stream: filtering streams, counting distinct elements in a stream, estimating moments, counting oneness in a window, decaying window, real time analytics platform (RTAP) applications, case studies, real time sentiment analysis, stock market predictions.	**10**
IV	**Framework, Technologies, Tools and Visualization:** MapReduce: Hadoop, Hive, MapR, Sharding, NoSQL Databases: S3, Hadoop distributed file systems, visualizations: visual data analysis techniques, interaction techniques; systems and analytics applications, analytics using statistical packages, industry challenges and application of analytics.	**9**

Text Books:

1. Bart Baesens, ***"Analytics in a Big Data World: The Essential Guide to data Science and its Applications",*** Wiley publications.

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2. Michael Berthold, David J. Hand, ***"Intelligent Data Analysis",*** Springer.
3. Anand Rajaraman and Jeffrey David Ullman, ***"Mining of Massive Datasets",*** Cambridge University Press.

Reference Books:

1. Bill Franks, ***"Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics",*** John Wiley & sons.
2. Glenn J. Myatt, "***Making Sense of Data",*** John Wiley & Sons.

CS-705: EMBEDDED SYSTEMS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the scientific principles and concepts behind embedded systems, and to obtain hands-on experience in programming embedded systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction To Embedded Systems:** Embedded systems, characteristics of embedded systems I/O, embedded systems/real time systems. embedded system software architecture, simple control loop, interrupts control system, co-operating multitasking, pre-emptive multitasking. **Timing Characteristics Of Embedded Systems:** Hard, soft and firm systems, performance analysis of embedded systems: software timing characterization and analysis methods.	**10**
II	**Real Time Operating Systems:** Real-time and non-real time applications. classification of real-time task scheduling algorithms, event-driven scheduler- simple priority-based, rate monotonic analysis, earliest deadline first, the simplest of task assignment and scheduling, priority scheduling, characteristics of tasks, task assignment and multi-tasking. **Memory Management And Synchronization For Embedded Software:** Semaphores, uses of semaphores, mutual exclusion, deadlock, starvation and lockouts, priority assignment, inversion, event flags and signals, inter task communication and resource sharing, synchronization, interrupt handlers.	**10**
III	**Software Engineering Issues In The Embedded Systems:** Domain analysis, software element analysis, requirement analysis, specification, software architecture, software analysis design, implementation, testing, validation, verification and debugging of embedded systems. iterative process development, agile software development process, introduction to use cases.	**10**
IV	**Programming languages for embedded systems:** Desirable characteristics of programming languages for embedded systems, low-level versus high-level languages, main language implementation issues: control, typing, exception handling, modularity and multi-threading. major programming languages for embedded systems: assembly, C/C++, Ada and Java, overview of PMC, effiel, forth.and overview of real time databases. **Compilation Techniques For Embedded Software:** code generation, retargetability, code optimization. Examples of embedded and real-time software systems**.**	**9**

Text Books:

1. Gomaa, "***Software Design Methods For Concurrent and Real-Time systems"***, Addison-Wesley.
2. Raj Kamal, "***Embedded Systems Architecture, Programming and Design"***, Tata Mcgraw Hill, New Delhi.

Reference books:

1. S. Allworth, "***Introduction to real-time Software design"***, Springer-Verlag.
2. C.M. Krishna, K.Shin, ***"Real-time Systems",*** Tata Mc-Graw Hill.
3. Peter Marwedel, G. Goosens, "***Code Generation for Embedded processors"***, Kluwer Academic publishers.

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CS-706: WEB TECHNOLOGY

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic scripting languages, server side programming and web databases.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Information Architecture:** The role of information architect, collaboration and communication, organizing information, organizational challenges, organizing web sites and intranets, creating cohesive organization systems, designing navigation systems, types of navigation systems, integrated navigation elements, designing elegant navigation systems, Searching systems, searching your web site, designing the search interface, indexing the right stuff, to search or not to search grouping content, conceptual design, high level architecture blueprint. architectural page mockups, design sketches.	**10**
II	**Dynamic HTML and Web Designing:** HTML basic concepts, good web design, process of web publishing phases of web site development, structure of HTML documents, HTML elements- core attributes, language attributes, core events, block level events, text level events, linking basics, linking in HTML, images and anchors, anchor attributes, image maps, semantic linking meta information, image preliminaries, image download issues, images and buttons, introduction to layout: backgrounds, color and text, fonts, layout with tables. advanced layout: frames and layers, HTML and other media types. audio support in browsers, video support, other binary formats. style sheets, positioning with style sheets. basic interactivity and HTML: forms, form control, new and emerging form elements.	**10**
III	**Java Server Pages:** Basics, integrating scripts in JSPs, jsp objects and components, configuring and troubleshooting, JSP: request and response objects, retrieving the contents of an HTML format, retrieving a query string, working with beans, cookies, creating and reading cookies. using application objects and events. **XML:** Relationship between HTML, SGML and XML, basic XML, valid documents, ways to use XML, XML for data files, embedding XML into HTML documents. converting XML to HTML for display, displaying XML using CSS and XSL, rewriting HTML as XML, the future of XML.	**10**
IV	**Php Mysql Introduction:** What is PHP, history, why choose PHP. **Installation:** Installation overview, configuration**,** advantage of PHP over other scripting language, creating a PHP script, handle error in PHP script**.**	**9**

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	Data Types: variables, strings, string functions, numbers, arrays, array functions, booleans and NULL, type switching and casting, constants. **Control Structures:** if, else, else-if, and switch statements, logical operators, while, for, for each loops, continue and break statements. **Functions:** Defining & using functions, returning values from a function, setting global variables, setting default values. **Building Web Pages:** Links and URLs, using GET values, encoding GET values, encoding for HTML, building forms, setting cookies, establishing sessions, headers and page redirection, including and requiring pages. **My SQL Basics:** Introduction to web form, My SQL introduction, creating a database in My SQL, populating a My SQL database, Php My Admin, connecting to My SQL with PHP, accessing data in My SQL with PHP.	

Text Books:

1. Web technology, "***Black Book by Kogent learning Inc"*** , Dreamtech publication
2. Thomas A Powell, HTML "***The Complete Reference",*** Tata McGraw Hill Publications
3. ***"HTML 5, Black Book",*** Wiley India Publication

Reference Books:

1. Joseph L.Weber, ***"Using Java 2 platform",*** Prentice Hall of India Pvt Ltd.
2. John R Hubbard, ***"Programming with Java, Schaum's Outline Series",*** McGraw Hill International.
3. Ian S. Graham, "***XHTML 1.0 Language and design sourcebook"***, John Wiley & sons inc.
4. Peter Rossbach, Hendrik Schreiber, ***"Java Server & services".*** Pearson education Ltd.
5. Joshu Marketos, ***"The Java developer tool kit",*** John Wiley and Sons.

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SEMESTER VIII

CS-801: MOBILE ADHOC & SENSOR NETWORKS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to learn the concepts of sensor networks, to understand the MAC and transport protocols for adhoc networks, to understand the security of sensor networks, to understand the applications of adhoc and sensor networks.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Ad Hoc Wireless Networks:** Characteristics of MANETs, applications of MANETs, challenges. **Routing in MANETs:** Topology-based versus position-based approaches, topology based routing protocols, position based routing, other routing protocols.	**10**
II	**Data Transmission In MANETs:** The broadcast storm, multicasting, geocasting. **TCP over Ad Hoc Networks:** TCP protocol overview, TOP and MANETs, solutions for TOP over Ad Hoc	**10**
III	**Basics of Wireless Sensors and Applications:** The mica mote, sensing and communication range, design issues, energy consumption, clustering of sensors, applications. **Data Retrieval In Sensor Networks:** Classification of WSNs, MAC layer, routing layer, high-level application layer support, adapting to the inherent dynamic nature of WSNs.	**10**
IV	**Security:** Security in Ad hoc wireless networks, key management, secure routing, cooperation in MANETs, intrusion detection systems. sensor network platforms and tools: sensor network hardware, sensor network programming challenges, node-level software platforms.	**9**

Text Books:

1. Car/os Corderlo Dharma R Aggarwal, ***"Ad Hoc and Sensor Networks — Theory and Applications"***, World Scientific Publications /Cambridge University Press.
2. Feng Zhao, Leonidas Guibas ***"Wireless Sensor Networks: An Information Processing Approach",*** Elsevier Science imprint, Morgan Kauffman Publishers.

Reference Books:

1. C.Siva Ram Murthy, B.S.Murthy, ***"Adhoc Wireless Networks — Architectures and Protocols"***, Pearson Education.
2. Fei Hu, Xiaojun Cao, ***"Wireless Sensor Networks — Principles and Practice"***, An Auerbach book, CRC Press, Taylor & Francis Group.
3. Subir Kumar Sarkar, et al.**,** ***"Wireless Ad hoc Mobile Wireless Networks — Principles, Protocols and Applications",*** Auerbach Publications, Taylor & Francis Group.
4. Charles E.Perkins, ***"Ad hoc Networking"***, Pearson Education.
5. Shih-Liri Wu, Yu-Chee Tseng, ***"Wireless Ad hoc Networking",*** Auerbach Publications, Taylor & Francis Group.
6. Jagannathan Sarangapani, ***"Wireless Ad hoc and Sensor Networks — Protocols, Performance and Control",*** CRC Press, Taylor & Francis Group.
7. Raheem Beyah, ***"Security in Ad hoc and Sensor Networks",*** World Scientific Publications / Cambridge University Press.
8. Ozan K.Tonguz, Giatuigi Ferrari,***"Ad hoc Wireless Networks — A communication-theoretic perspective",*** Wiley India.

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CS-802: DISTRIBUTED SYSTEMS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to learn the concepts of distributed systems, RPC & its importance, synchronization and distributed shared systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals:** Evolution of distributed computing systems, system models, issues in design of distributed systems, distributed computing environment, web based distributed model, computer networks related to distributed systems and web based protocols. **Message Passing:** inter process communication, desirable features of good message-passing systems, issues in IPC by message, synchronization, buffering, multidatagram messages, encoding and decoding of message data, process addressing, failure handling, group communication.	**10**
II	**Remote Procedure Calls:** The RPC model, transparency of RPC, implementing RPC mechanism, stub generation, RPC messages, marshaling arguments and results, server management, communication protocols for RPCs, complicated RPCs, client-server binding, exception handling, security, some special types of RPCs, lightweight RPC, optimization for better performance. **Distributed Shared Memory:** Design and implementation issues of DSM, granularity, structure of shared memory space, consistency models, replacement strategy, thrashing, other approaches to DSM, advantages of DSM.	**10**
III	**Synchronization:** Clock synchronization, event ordering, mutual exclusion, election algorithms. **Resource and Process Management:** Desirable features of a good global scheduling algorithm, task assignment approach, load balancing approach, load sharing approach, process migration, threads, processor allocation, real time distributed systems.	**10**
IV	**Distributed File Systems:** Desirable features of a good distributed file systems, file	**9**

	models, file accessing models, file-shearing semantics, filecaching schemes, file replication, fault tolerance, design principles, sun's network file system, andrews file system, comparison of NFS and AFS. **Naming:** Desirable features of a good naming system, fundamental terminologies and concepts, systems-oriented names, name caches, naming & security, DCE directory services.	

Text Books:

1. Pradeep K. Sinha, ***"Distributed OS",*** PHI.
2. Tanenbaum S.: "***Distributed Operating Systems"***, Pearson Education.
3. George Coulouris, Jean Dollimore. Tim Kindberg: "***Distributed Systems concepts and design".***

Reference Books:

1. Tanenbaum S. Maarten V.S.: "***Distributed Systems Principles and Paradigms"***, (Pearson Education)
2. M. Singhal & N. Shivaratri, ***"Advanced Concepts in Operating Systems"***

CS-803: SOFT COMPUTING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to learn the concepts of fuzzy sets, fuzzy logic and heuristics based on human experience. Learn the mathematical background for carrying out optimization associated with soft computing. Learn genetic algorithms and random search procedures.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Neural Networks:** Basic concepts, human brain, neural network architecture, characteristic of neural network, scope of neural network , hybrid system , evolution of neural network , basic models of artificial neural network , important terminologies of ANNs, Mcculloch-Pitts Neuron , liner separability, Hebb network, perceptron network, back propagation network, radital basis function network , tree neural network	**10**
II	**Associative Memory:** Training algorithm for pattern association, auto associative memory network, hetrocorrelation, exponential BAM, associative memory for real coded pattern pairs, kohonenself organizing features maps. **Adaptive Resonance theory network:** Introduction, ARTI1, ART2, application	**10**
III	**Probabilistic Reasoning Fuzzy Logic:** Introduction to fuzzy logic, fuzzy v/s crisp , fuzzy sets, crisp set, properties of fuzzy sets, crisp relation, cartesian product of relation, classical relation, fuzzy relation, tolerance and equivalence relation , crisp logic, fuzzy rule base system, fuzzification, method of membership value assignments, defuzzification method, application, fuzzy arithmetic and fuzzy measure, FIS.	**10**
IV	**Genetic Algorithms:** Introduction, traditional optimization and search technique, genetic algorithm and search space, genetic algorithm v/s traditional algorithm, fitness computations, cross over, mutation, reproduction, rank method, rank space method, genetic modeling: inversion and deletion, mutation operator, bitwise operator, introduction to hybrid system.	**9**

Text Books:

1. S.N Sivanandam & Deep, ***"Principle of Soft Computing"***, Wiley India Publication.
2. S. rajasekaran, ***"Neural network, Fuzzy logic and Genetic alogritham"*** PHI.
3. Stuart J . Russel ,Norvig , ***"AI A Modern Approach"*** , Pearson Education.
4. Michael Negnevitsky, "***Artificial Intelligence: A Guide to Intelligent Systems"***, 2/E, AddisonWesley.

Reference Book:

1. James Freeman A. and David Skapura "***M Neural Networks - Algorithms, Applications & Programming Techniques",*** Addison Wesley.
2. Yegnanarayana B , ***"Artificial Neural Networks"***, Prentice Hall of IndiaPrivate Ltd., New Delhi.
3. Goldberg, David E ***"Genetic algorithms in search, optimization and machine learning"***, Addison Wesley.

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IT-801: MOBILE APPLICATION DEVELOPMENT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts development tools in the Android development environment, use the major components of Android API set to develop their own apps, describe the life cycles of Activities, Applications and Fragments, Sensors like Gyroscopes, Accelerometers and GPS to add orientation and location to their apps.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basic Android Concepts:** Introduction to android - history of android ,the open handset alliance, android SDK installation ,android SDK & their codenames , advantages of android, the android O/S architecture, overview of IDE for android application, what is AVD , how to launch and start the AVD (android virtual device) **Managing Application Resources** - what are resources, resource value types, storing different resource values types (string, string arrays, boolean, colors, integer, animation, & menus). **Android Application Components** - Activities & its life cycle , services & its life cycle, broadcast receiver, content provider, intents, shutting down component , android manifest file in detail ,use of intent filter.	**10**
II	**Widgets – User Interface Elements:** Form widgets – text view, basic button, toggle button, check box, checked text view, radio buttons, radio group, spinner control, date picker, time picker , chronometer, progress bar, rating bar, option menu, image view text fields - various type of text fileds (plain text, password text, numeric text, email text, phone text, multiline text etc) **Working with various type of dialog** - Simple dialog, alert dialog, character picker dialog, date picker dialog, progress dialog , list dialog, custom dialog toast – (custom toast) **Features of android:** Styles and themes - basic styles & themes in XML layout various layouts - what is layout, layouts common attribute, types of layout (linear layout, relative layout, table layout , frame layout ,tab layout)	**10**

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	Using Data-Driven Containers - List view, grid view, and gallery view (using the array adapter) **App widgets** - What is app widget, use of App widgets, creating app widget configuration activity	
III	**Data Storage:** Introduction to data storage - introduction to various storage options available in android system. **Working with Application Preferences**-Creating private and shared preferences, manipulating with shared preferences, read/write data on the android file system [internal storage]. **Storing Structured Data Using SQLite Databases** - Creating a SQLite database, creating tables and other SQLite schema objects, creating, updating, and deleting database records, querying SQLite databases, working with cursors, closing and deleting a SQLite database	**10**
IV	**Networking Features:** Using networking: understanding mobile networking fundamentals, accessing the internet (HTTP), browsing the web with web view, calling. **PHP From Android**: Pass android application data to PHP, manipulate android data in MYSQL using PHP. **Telephony API:** Basic of telephony manager, sending SMS, call state	**9**

Text Books:

1. Rick rogers,John Lombardo – O‟Reilly ***"Android Application Development",.***
2. Reto Meier – Wrox***, "Professional Android 2 application development".***

Reference Books:

1. Lauren Darcey and Shane Conder, ***"Android Wireless Application Development",*** Pearson Education.
2. Wei-Meng Lee, ***"Beginning Android Application Development"*** Wrox Publication.
3. Frank Ableson and Charlie Collins and Robi Sen***, "Unlocking Android Developers Guide"*** , Manning Publication Co.

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IT-802: NATURAL LANGUAGE PROCESSING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

This course provides an introduction to the field of natural language processing. It includes relevant background material in Linguistics, Mathematics, Probabilities and Computer Science. Some of the topics covered in the class are Text Similarity, Part of Speech Tagging, Parsing, Semantics, Question- Answering, Sentiment Analysis and Text Summarization.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Origin of natural language processing (NLP), challenges of NLP, NLP applications, processing indian languages. **Language Modeling:** Various grammar based language models, statistical language model.	**10**
II	**Word Level Analysis:** Morphological parsing, spelling errors detection and correction, part-of-speech tagging. **Syntactic and Semantic Analysis:** Parsing, lexical semantics, ambiguity, word sense disambiguation.	**10**
III	**NLP Tools:** Morphological analyzer, parser, part-of-speech tagger, WordNet. **Machine Translation:** Need of MT, problems of machine translation, MT approaches, direct machine translations, rule-based machine translation, knowledge based MT system, statistical machine translation, UNL based machine translation, translation involving indian languages.	**10**
IV	**Information Retrieval:** Features of information retrieval systems, natural language processing in IR, cross-lingual IR. **Other Applications:** Information extraction, question-answering system, natural language interface to databases.	**9**

Text Books:

1. Siddiqui and U.S. Tiwary, "***Natural Language Processing and Information Retrieval"***, Oxford Press.

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2. J.Allen, "***Natural Language understanding"***, Benjamin/Cunnings.

Reference Books:

1. Akshar Bharati, Vineet Chaitanya, and Rajeev Sangal. "***NLP: A Paninian Perspective"***, Prentice Hall, New Delhi.

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IT-803: CYBER SECURITY & CYBER LAWS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

This course will provide a basic introduction to of all aspects of cyber-security including business, policy and procedures, communications security, network security, security management, legal issues, political issues, and technical issues. This serves as the introduction to the cyber security track in electrical and computer engineering department.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Cybercrime:** Cybercrime definition and origins of the world, cybercrime and information security, classifications of cybercrime, cybercrime and the Indian ITA 2000, A global perspective on cybercrimes. **Cyber offenses & Cybercrime:** How criminal plan the attacks, social engg, cyber stalking, cybercafe and cybercrimes, botnets, attack vector, cloud computing, proliferation of mobile and wireless devices, trends in mobility, credit card frauds in mobile and wireless computing era, security challenges posed by mobile devices, registry settings for mobile devices, authentication service security, attacks on mobile/cell phones, mobile devices: security implications for organizations, organizational measures for handling mobile, devices-related security issues, organizational security policies and measures in mobile computing era, laptops.	**10**
II	**Tools and Methods Used in Cyber line:** Proxy servers and anonymizers, phishing, password cracking, keyloggers and spywares, virus and worms, steganography, DoS, DDoS attacks, SQL injection, buffer over flow, attacks on wireless networks, phishing, identity theft (ID theft). **Cybercrimes and Cyber security: The Legal Perspectives:** Why do we need cyberlaw: the indian context, the indian IT act, digital signature and the indian IT act, amendments to the indian IT act, cybercrime and punishment, cyberlaw, technology and students: indian scenario.	**10**
III	**Understanding Computer Forensics:** Historical background of cyber forensics, digital forensics science, the need for computer forensics, cyberforensics and digital evidence, forensics analysis of email, digital forensics lifecycle, chain of custody concept, network forensics, approaching a computer forensics investigation, setting of a computer forensics	**10**

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	laboratory: understanding the requirements, computer forensics and steganography, relevance of the OSI 7 layer model to the computer forensics and social networking sites: the security/privacy threats, forensics auditing, anti forensics.	
IV	**Cyber security: Organizational Implications:** Cost of cybercrimes and IPR issues: lesson for organizations, web treats for organizations: the evils and perils, security and privacy implications from cloud computing, social media marketing: security risk and perils for organization, social computing and the associated challenges for organizations, protecting people's privacy in the organization, organizational guidelines for internet usage, safe computing guidelines and computer usage policy, incident handling: an essential component, intellectual property in the cyberspace of cyber security, importance of endpoint security in organizations.	**9**

Text Books:

1. Nina Godbole & Sunit Belapure ***"Cyber Security",*** Wiley India.

Reference Book:

1. Harish Chander, ***"Cyber laws & IT protection",*** PHI learning pvt.ltd.
2. Dhiren R Patel, ***"Information security theory & practice",*** PHI learning pvt ltd.
3. MS.M.K.Geetha & Ms.Swapne Raman ***"Cyber Crimes and Fraud Management",*** MACMILLAN.
4. Pankaj Agarwal : "***Information Security & Cyber Laws (Acme Learning)",*** Excel.
5. Vivek Sood, "***Cyber Law Simplified",*** TMH.

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CS-804: PROJECT WORK - II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	16	8	50	50	100	2Hrs

This project work shall be carried out by the students during the entire semester under the guidance of Supervisor allotted by the institute and its viva will be conducted at the end of the semester.

Project Evaluation will consist of Three parts:
1. Evaluation of the project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous evaluation by internal examiner 30% marks.
2. Viva-voce examination (20% marks).
3. Software evaluation with test runs (10% marks)

Viva-voce examination will be related to the projects executed by the candidate during the course of the semester.

Aim of this Project:
Aim of this project is to equip students in the methodology of the system analysis and design of a live project in the institution in which he/she is studying or in a place of work such as bank, school, college and office in the vicinity of the institute.
This will be a guided project under the close supervision of the faculty of the institute. Projects should be presented in the form of a project report giving a candidate system for solving a live problem.

OR

CS-811: INDUSTRIAL PROJECT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	16	8	50	50	100	2Hrs

Industrial Project of Four months duration is to be carried out by the student exclusively in industry under the joint supervision of faculty advisers from institution as well as from the industry. Student is supposed to submit the project report at the end of the training.

Project Evaluation will consist of Three parts:
1. Evaluation of the project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous evaluation by internal examiner 30% marks.
2. Viva-voce examination (20% marks).
3. Software evaluation with test runs (10% marks)

Viva-voce examination will be related to the projects executed by the candidate during the course of the semester.

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Aim of this Project:

Aim of this project is to equip students in the methodology of the system analysis and design of a live project in the industry or in a place of work such as bank, school, college and office in the vicinity.

Projects should be presented in the form of a project report giving a candidate system for solving a live problem.

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