Annasaheb Dange College of Engineering and Technology

Ashta, Dist: Sangli-416301 (An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Department of Computer Science and Engineering

Vision & Mission of Institute

Vision: To be a Leader in preparing professionally competent engineers

Mission: We, at Annasaheb Dange College of Engineering and Technology, Ashta, are committed to achieve our vision by
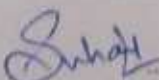
- Imparting effective outcome based education.

- Preparing students through skill oriented courses to excel in their profession with ethical values.

- Promoting research to benefit the society.

- Strengthening relationship with all stakeholders.

Vision & Mission of Department

Vision: To be a leader at serving society by producing professionally competent Computer Engineers.

Mission: We at department of Computer Science and Engineering are committed to achieve our vision by,

- Imparting academic excellence through outcome-based education.

- Transforming students through skill oriented courses with ethical values.

- Grooming students for employment, higher studies and entrepreneurial ventures.

- Strengthening relationship with stakeholders for continuous development.

Head of Department

Annasaheb Dange College of Engineering and Technology

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Department of Computer Science and Engineering
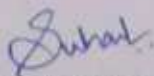
Program Educational Objectives (PEOs)

Graduates of Computer Science and Engineering possess:

PEO 1:	Knowledge of Computer Science that will act as a foundation for solving real life problems with the help of team work, critical thinking and effective communication.
PEO 2:	Ability to solve hardware and software engineering problems by their knowledge in core computer science and allied engineering.
PEO 3:	Awareness of environmental and societal issues in computer science and engineering while they get engaged into employment, higher studies or entrepreneurial ventures.
PEO 4:	Ability to adapt to changing environment by making use of contemporary technologies and tools.

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Department of Computer Science and Engineering

Program Outcomes (POs)

PO 1	An ability to apply mathematical, scientific and technical knowledge to solve problems in Computer Science and Engineering.
PO 2	An ability to identify, formulate, review and solve Computer Science and Engineering problems.
PO 3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturing and sustainability.
PO 4	An ability to design and conduct experiments, as well as to analyze and interpret data in the domain of Computer Science and Engineering.
PO 5	An ability to apply emerging modern tools and software's for prediction, modeling and solution for computer science engineering problems.
PO 6	Knowledge of contemporary issues relevant to professional computer engineering practices.
PO 7	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
PO 8	An understanding of professional and ethical responsibility.
PO 9	An ability to function effectively as an individual and as a team member in Computer Science and Engineering projects encompassing multidisciplinary teams.
PO 10	An ability to design and create project reports and associated documents, prepare presentations related to them and communicate both orally and in written form.
PO 11	An ability to understand and apply the management principles along with engineering skill in their work to manage projects in Computer Science and Engineering domain.
PO 12	Engagement in lifelong learning for updating oneself on advancements in Computer Science and Engineering

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Department of Computer Science and Engineering

Program Specific Outcomes (PSOs)

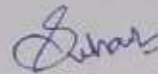|	
PSO 1	An ability to recognize changes in state of the art technology and science with respect to software development lifecycle
PSO 2	An ability to understand various methodologies of software system for improving competencies with a broad range of programming languages and open source platforms

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An Autonomous Institute affiliated to Shivaji University, Kolhapur

Curriculum Structure

S. Y. B. Tech.
COMPUTER SCIENCE AND ENGINEERING

SEM III & SEM IV

(Academic Year 2018-19)

NDCET Department of Computer Science & Engineering

Teaching and Evaluation Scheme

B. Tech.: III Semester

Course Code	Course	Teaching Scheme				Evaluation Scheme				
							Theory Marks		Practical Marks	
		L	T	P	Credits	Scheme	Max.	Min. for Passing	Max.	Min. for Passing
0CSBS201	Discrete Mathematics	3	1	0	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC202	Data Structures	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC203	Data Communication	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC204	Processor Architectures	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSBS205	Statistics and Fuzzy Systems	3	1	0	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC251	Data Structures Laboratory	0	0	4	2	ISE	--		50	20
						ESE	POE		50	20
0CSPC252	Processor Architectures Laboratory	0	0	2	1	ISE	--		50	20
						ESE	POE		50	20
0CSES253	Programming Laboratory-I	2	0	4	4	ISE	--		50	20
						ESE	POE		50	20
0CSAC211	Communication Skills	0	1	0	-	ISE	Grade		50	20
	Total	17	3	10	24		500		300	
	Total Contact Hours/ Week: 30Hrs									

Course Category	HS	BS	ES	PC	PE	OE	PR
Credits	-	8	4	12	-	-	-
Cumulative Sum	3	24	33	12	-	-	-

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2

Teaching and Evaluation Scheme
B. Tech.: IV Semester

Course Code	Course	Teaching Scheme				Evaluation Scheme				
						Scheme	Theory Marks		Practical Marks	
		L	T	P	Credits		Max	Min. for Passing	Max	Min. for Passing
0CSBS206	Theory of Computer Science	3	1	0	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC207	Computer Networks	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC208	Operating System-I	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC209	Software Engineering	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC210	Computer Architecture	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC254	Operating System-I Laboratory	0	0	2	1	ISE	--		25	10
						ESE	POE		50	20
0CSPC255	Computer Networks Laboratory	0	0	2	1	ISE	--		25	10
						ESE	POE		50	20
0CSES256	Programming Laboratory- II	2	0	4	4	ISE	--		50	20
						ESE	POE		50	20
0CSPR257	Mini-Project	0	0	2	1	ISE	--		25	10
						ESE	POE		25	10
0CSMC212	Environmental Studies	2	0	0	-	ISE	Grade		50	20
Total		**19**	**1**	**10**	**23**		**500**		**300**	
Total Contact Hours/Week: 30hrs										

Course Category	HS	BS	ES	PC	PE	OE	PR
Credits	-	4	4	14	-	-	01
Cumulative Sum	3	28	37	26	-		01

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3

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Course Details:

Class	B. Tech., Sem. III
Course Code and Course Title	0CSBS201- Discrete Mathematics
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial	3/1
Credits	04
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

1	To learn logic theory in solving real life problems.
2	To grasp mathematical logic and simple reasoning paradigms.
3	To interpret set theory, graph theory & algebraic structures.
4	To understand discrete probability and combinatory.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

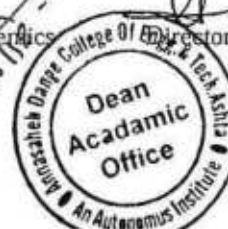| 0CSBS201_1	**Explain** the fundamental concepts of Discrete Mathematical Structures. (K2)
0CSBS201_2	**Apply** equivalence formulas/laws to solve problems. (K3)
0CSBS201_3	**Make use of** logical notation to define and reason about fundamental mathematical concepts such as sets, relations & functions. (K3)
0CSBS201_4	**Describe** the concepts of algebraic systems, lattices & Boolean algebra. (K2)
0CSBS201_5	**Apply** graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction. (K3)
0CSBS201_6	**Apply** the appropriate formulas to calculate permutations and combinations. (K3)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Mathematical logic:** Introduction, statements and notations, connectives – negation, Conjunction, disjunction, conditional, bi-conditional, Statement formulas and truth tables, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms, completely parenthesized infix and polish notations	08 Hrs.
Unit 2	**Set theory:** Basic concepts of set theory, types of operations on sets, ordered pairs, Cartesian Product, representation of discrete structures, relation, properties of binary relations, matrix and graph representation, partition and covering of set, equivalence relation, composition, POSET and Hasse diagram, Function – types, composition of functions, Inverse function.	08 Hrs.
Unit 3	**Algebraic systems:** Semigroups and Monoids, properties and examples, Groups: Definition and examples, subgroups and homomorphism.	05 Hrs.
Unit 4	**Lattices and Boolean algebra:**	08 Hrs.

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	Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, Special lattices, Boolean algebra definition and examples, Boolean functions, representation and minimization of Boolean functions.		
Unit 5	**Graph theory:** Basic concepts of graph theory, Storage representation and manipulation of Graphs, PERT and related techniques.		07 Hrs.
Unit 6	**Permutations, Combinations and Discrete Probability:** Permutations and Combinations: rule of sum and product, Permutations, Combinations, Discrete Probability, Conditional Probability, Bayes' Theorem		06 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Discrete Mathematical Structures with application to Computer Science	J. P. Tremblay & R. Manohar	Tata MGH International	-	2007
2	Elements of Discrete Mathematics	C. L. Liu and D. P. Mohapatra	SiE Edition, TataMcGraw-Hill	4th	2013
3	Theory of Computation	Sushilkumar Azad	DhanpatRai and Co.	2nd	2005
4	Discrete mathematical Structures	Bernard kolman, Robert Busby, S. C. Ross and NadeemurRehman	Person Education	2nd	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Discrete Mathematics and its Applications	Kenneth H. Rosen (AT&T Bell Labs) (mhhe.com/rosen)	Tata McGraw Hill	7th	2012
2	Discrete Mathematics, Schaum's outlines.	SemyourLipschutz, MarcLipson	Tata McGraw Hill	3th	2012
3	Discrete Mathematical Structures	Bernard Kolman, Robert Busby, S.C.Ross	PHI Learning Pvt Ltd	6th	2009
4	Foundation of Discrete mathematics	K. D. Joshi	New Age International Ltd	5th	2003

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Course Details:

Class	B. Tech, Sem. III
Course Code and Course Title	0CSPC202- Data Structures
Prerequisite/s	0BSES112- Computer Programming
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:	
1	To develop programming skills for advanced computer science courses.
2	To understand elementary linear and non-linear data structures and concepts of ADTs
3	To apply appropriate data structure for solving given problem.
4	To analyze and compare various searching and sorting techniques.

| Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0CSPC202_1	Describe basic fundamentals in data structures. (K2)
0CSPC202_2	Explain the fundamental concepts of structuring, managing and organizing the data using linear and non-linear data structures with ADTs. (K2)
0CSPC202_3	Apply appropriate linear and nonlinear data structure to solve the problems. (K3)
0CSPC202_4	Compare and analyze different data structure algorithms and searching, sorting methods. (K4)

Course Contents:		
Unit No	Unit Name	Contact Hours
Unit 1	**Basics of Data Structures:** Algorithm, Space and Time Complexity, Direct and Indirect recursion, analysis of recursive functions e.g. Towers of Hanoi	4 Hrs
Unit 2	**Stack and Queue** Stacks: Definition, representation, operations, static implementation and applications of stack. Queues: Definition, representation, operations, static implementation and applications of queue, circular queue, priority queue.	7 Hrs
Unit 3	**Lists** Definition representation, operations, implementation and applications of singly, doubly and circular linked lists. Implementation of stack and queue using linked lists.	10 Hrs
Unit 4	**Searching and Sorting Techniques** Linear search, binary search, bubble sort, selection sort, insertion sort, merge sort, quick sort, radix sort. Hashing – Definition, hash functions, overflow, collision, Collision	9 Hrs

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6
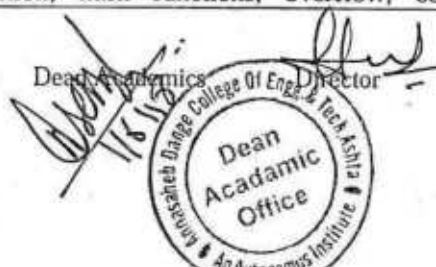
	resolution techniques, Open addressing, Chaining.		
Unit 5	**Trees** Basic terminology, representation, binary tree, traversal methods, binary search tree, AVL search tree, B tree, Heaps- Operations and their applications.	7 Hrs
Unit 6	**Graphs** Basic concept of graph theory, storage representation, graph traversal techniques- BFS and DFS, Graph representation using sparse matrix	5 Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data Structures- A Pseudocode Approach with C	Richard F. Gilberg and Behrouz A. Forouzon	PWS Publishing Company	2nd	2004
2	Data Structures with C Schaum's Outlines Series	S. Lipschutz	Tata McGraw-Hill	-	2017
3	Data Structure using C	ReemaThareja	Oxford	2nd	2014

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data Structure using C	A. M. Tanenbaum, Y. Langsam, M. J. Augenstein	Prentice-Hall Of India Pvt. Limited	-	2003
2	Understanding Pointers in C	YashavantKanetkar	BPB Publication	1st	2009
3	C and Data Structures	N. B. Venkateshwarlu, E. V. Prasad	S. Chand and Company	-	2010
4	Let Us C	YashavantKanetkar	BPB Publication	15th	2016

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7

Course Details:

Class	B. Tech, Sem. III
Course Code and Course Title	0CSPC203- Data Communication
Prerequisite/s	0BSES109- Basic Electronic Engineering
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

1	To study the fundamental concept and principles of data communication.
2	To make students understand working of various network models and layers.
3	To learn various protocols used in data link layer and switching methods for LANs.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

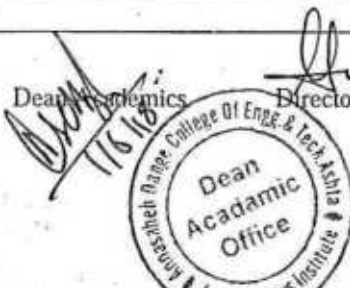| 0CSPC203_1	**Explain** the fundamental of data communication. (K2)
0CSPC203_2	**Summarize** the layered architecture of network models with topologies and different communication protocols (K2)
0CSPC203_3	**Explain** analog and digital data transmission methods, line coding schemes and different transmission media (K2)
0CSPC203_4	**Describe** protocols and techniques of error detection and correction in data link layer. (K2)
0CSPC203_5	**Explain** working of multiplexing and switching methods. (K2)
0CSPC203_6	**Apply** different formulas to solve communication problems (K3)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Communication Basics:** Introduction: Data communications, Networks, Protocols & standards. Data & Signals: - Analog & Digital, Periodic analog signals, digital signals, Transmission Impairments (Attenuation, Distortion, Noise), Data rate limits & Performance (Throughput, Propagation Speed, Propagation time)	07 Hrs.
Unit 2	**Network Models** Network topologies, Categories of Networks, Layered Tasks, The OSI model, Layers in the OSI model, TCP/IP protocol suit.	07 Hrs.
Unit 3	**Physical Layer** Digital Transmission :- Line coding, Line coding Schemes (Unipolar, polar & Bipolar), Transmission modes(Asynchronous and synchronous transmission) Transmission media :- Guided, Unguided media Guided Media: Twisted pair cable, Coaxial cable, Optical Fiber cable. Unguided Media: Radio frequency allocation, Propagation of Radio waves, Terrestrial microwave, Satellite communication, Cellular Telephony	07 Hrs.
Unit 4	**Data Link Layer**	07 Hrs.

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8

	Error detection & correction:- Block coding, Linear block codes, cyclic codes, checksum Data Link Control: - Framing, Flow & error control, Protocols (Stop &Wait Protocols, Go Back N &Selective Repeat Sliding window protocols, Noiseless channels, Noisy channels, HDLC&DLC protocol.	
Unit 5	**Multiple Access Protocols** Random Access Protocols: - ALOHA, CSMA, CSMA/CD, CSMA/CA. Controlled Access Protocols: - Reservation, Polling, And Token Passing. Channelization Protocols :-FDMA, TDMA, CDMA	08 Hrs.
Unit 6	**Multiplexing and Switching Methods:** Frequency & Wavelength division multiplexing, Synchronous & Statistical Time division multiplexing; Circuit switching-Circuit switching Networks & Concepts (Routing), Virtual Circuit Switching Networks, Principles of Message & packet switching.	06 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data Communications and Networking	Behrouz A Forouzan	Tata McGraw-Hill	4th	2012
2	Computer Networks	Andrew S. Tanenbaum	Prentice Hall	5th	2011
3	Computer communications and Networking Technologies	Michael A Gallo	Cengage Learning	-	-

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data & computer communications	William Stallings	Pearson Education	8th	2011
2	Data communication and computer Networks	Ajit Pal	PHI Learning	1st	2014
3	Computer Networking : Principles, Technologies and protocols of network design –	Natalia Olifer and victor Olifer	Wiley India Edition	1st	2009

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Course Details:

Class	B. Tech, Sem. III
Course Code and Course Title	0CSPC204- Processor Architectures
Prerequisite/s	0BSES109-Basic Electronic Engineering
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:	
1	To understand microprocessors with its physical, logical and segment address structure.
2	To comprehend 8085 assembly programming constructs and apply these constructs in assembly language programming.
3	To inspect a typical I/O interface and debate on timing diagrams for various instructions.
4	To discern microprocessor memory management policies and its protection issues.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

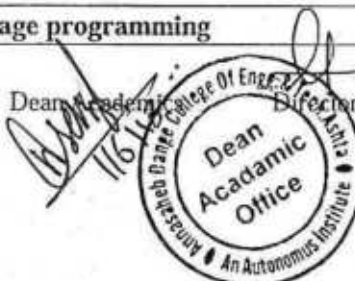|	
0CSPC204_1	Explain architectures of Microprocessors with its pin configuration. (K2)
0CSPC204_2	Illustrate different interrupt mechanisms and stack operations in microprocessors. (K2)
0CSPC204_3	Explain concepts of interfacing peripheral devices with microprocessors. (K2)
0CSPC204_4	Compare different microprocessors. (K2)
0CSPC204_5	Apply instructions of 8085 microprocessor in assembly language programming. (K3)
0CSPC204_6	Design an n-bit microprocessor with its physical, logical and segment address structure. (K3)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Microprocessor Architecture and Microcomputer System** Microprocessor Architecture and its operation- Microprocessor initiated operations, internal operation, and Peripheral operation. Memory- Flip-flop or latch as storage element, memory map and addresses, memory and instruction fetch, memory classification, Input and output devices.	07 Hrs.
Unit 2	**8085 Microprocessor Architecture** The 8085 MPU, Microprocessor communication and bus timing, De-multiplexing address and Data bus, Generating control signals, The 8085Architecture, and 8085 based microcomputer-machine cycles and bus timing, op-code fetch machine cycle, memory read and write machine cycle. Memory interfacing-memory structure, basic concepts in memory interfacing.	07 Hrs.
Unit 3	8085 assembly language programming	07 Hrs.

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	The 8085 programming model, instruction classification, instruction and data format, Writing and execution of assembly language program. The 8085 instruction-data transfer operations, addressing modes, Arithmetic operation, Flag concept and cautions, Logic operations, Branch operations.		
Unit 4	**Stack and interrupt** Stack, Instruction related to stack, Important concept in stack, execution of CALL and RET. The 8085 interrupt, RST instructions, vectored interrupts.	07 Hrs.
Unit 5	**8086 and The 80386 Microprocessor** Pin-Outs and Pin Function of 8086, Architecture of 8086, The 80386 Microprocessor: The memory System,80386 Memory Management,Virtual 8086 Mode.	07 Hrs.
Unit 6	**Pentium , Pentium Pro and Pentium 4 Microprocessor** The Pentium Microprocessor: The Memory System,Special Pentium Registers,Pentium Memory Management, The Pentium Pro Microprocessor: Internal structure of the Pentium Pro,The Pentium 4: Memory Interface.	07 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microprocessor Architecture – programming and applications with 8085	Ramesh Gaonkar	Penram International	4th	2007
2	The INTEL Microprocessors - Architecture, Programming and Interfacing	Barry B. Brey Seventh Edition	PHI Ltd	8th	2010
3	Microprocessors and Microcontrollers	N. Senthi Kumar, M. Saravanan and S. Jeevananthan	Oxford University Press	2nd	2001
4	Introduction to Microprocessors and Microcontrollers	John Crisp	ELSEVIER	2nd	1998

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microcomputer system – The 8086/8088 family	Liu & Gibson	PHI	1st	2001
2	Advanced microprocessors & peripherals	A K Ray & K M Bhurchandi	Tata McGrawHill	2nd	2012
3	Microprocessors & Interfacing	Douglas Hall	Tata McGraw Hill	2nd	2005
4	Microprocessor 8086 : Architecture, Programming and Interfacing	Mathur Sunil	PHI Publication	4th	2011

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1/6/18

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11

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Course Details:

Class	B. Tech, Sem.-III
Course Code and Course Title	0CSBS205, Statistics and Fuzzy Systems
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial	3/1
Credits:	04
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:	
1	To learn the statistical and operational research techniques for the prediction of data and to develop mathematical skills and enhance thinking power of students.
2	To expose the students to the topics in fuzzy set theory with an emphasis on the application of solving engineering problems.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSBS205_1	Describe the statistical data numerically by using lines of regression and curve fittings.(K2)
0CSBS205_2	Explain fuzzy sets using linguistic words and represent these sets by membership functions, convexity, Normality, support, etc. (K2)
0CSBS205_3	Apply Knowledge of probability and statistics, Binomial, Poisson, and Normal including applications in real life problem. (K3)
0CSBS205_4	Solve examples on the principle in performing fuzzy number arithmetic operations such as Addition, Multiplication, division & fuzzy equations etc. (K3)
0CSBS205_5	Solve examples based on assignment problems and game theory. (K3)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Curve Fitting Lines of Regression of Bivariate Data, Fitting of Curves by Method of Least Squares, Fitting of Straight Lines, Fitting of exponential curves, Fitting of Parabolic curves.	07
Unit 2	**Probability Distribution** Random variable (Discrete & Continuous), Binomial Distribution, Poisson Distribution, Normal Distribution.	07
Unit 3	**Introduction to Fuzzy sets** Basic concepts of Fuzzy Sets, Crisp Set and Fuzzy Set, Membership Functions, Basic operations on fuzzy sets, Properties of fuzzy sets.	07
Unit 4	**Fuzzy Arithmetic** Fuzzy Numbers, Fuzzy Cardinality, Operations on Fuzzy Numbers, Fuzzy Equations of Type $A + X = B$ and $A.X = B$.	07

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12

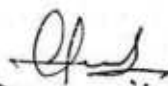| Unit 5	**Assignment Problems** Introduction, Definition, Hungarian method of solving balanced assignment problems, Hungarian method of solving unbalanced assignment problems, Traveling salesmen problem.	08
Unit 6	**Game Theory** Introduction to Game Theory, Two Person Zero Sum Game, Use of Dominance Principle, Use of Sub-Game Method, Use of Graphical Method	06

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	A Text Book of Engineering Mathematics (For Unit 1 & 2)	N. P. Bali, Manish Goyal	Laxmi Publications(P) Ltd	8	2011
02	Fuzzy Sets and Their Applications. (For Unit 3 & 4)	Pundir and Pundir	PragatiPrakashan.	2	2008
03	Operation Research (For Unit 5 & 6)	S Kalavathy	Vikas Publishing House PVT LTD	2	2008
04	Fuzzy Sets & Fuzzy Logic Theory and Applications (For Unit 3 & 4)	George J. Klir and Bo Yuan	PHI Learning Private Limited	1	2013

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Probability and Statistics for Computer Science	James L. Johnson	Wiley	1	2008
02	Fuzzy Logic With Engineering Applications	Timothy J. Ross	Wiley	3	2013
03	Operations Research: Theory, Methods and Applications	S. D. Sharma, Himanshu Sharma	Kedarnath, Ramnath& Co.	15	2011
04	Operation Research	S. D. Sharma	Kedarnath, Ramnath& Co.	14	2005

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13

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Course Details:

Class	B. Tech, Sem. III
Course Code and Course Title	0CSPC251- Data Structures Laboratory
Prerequisite/s	0BSES161- Computer Programming Laboratory
Teaching Scheme: Practical	4
Credits	02
Evaluation Scheme: ISE / ESE	50/ 50

Course Objectives:

1	To develop programming skills for advanced computer science courses.
2	To understand elementary linear and non-linear data structures and concepts of ADTs
3	To apply appropriate data structure for solving given problem.
4	To analyze and compare various searching and sorting techniques.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPC251_1	**Demonstrate** basic fundamentals in data structures. (K3)
0CSPC251_2	**Apply** appropriate data structures like stack and queue for solving real life problems. (K3)
0CSPC251_3	**Apply** different types of linked list and operations related to each type of linked list. (K3)
0CSPC251_4	**Analyze** searching and sorting techniques for data identification and retrieval (K4)
0CSPC251_5	**Formulate** and **design** solution and debug programs using stack, queue, tree and graphs data structures. (A4)
0CSPC251_6	**Proficiently use** data structures to solve problems. (S3)

Course Contents:
Perform Minimum 16-18 Experiments based on following list:

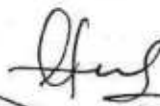| Expt. No.	Title of Experiment
1	Program for recursion using functions
2	Program for implementation of stack using array
3	Program for implementation of infix to postfix
4	Program for evaluation of postfix expression
5	Program for implementation of queue using array
6	Program for implementation of circular queue using array
7	Program for implementation of priority queue using array
8	Program for implementation of singly linked list
9	Program for implementation of doubly linked list
10	Program for implementation of circular linked list
11	Program for implementation of linear search.
12	Program for implementation of binary search
13	Program for implementation of bubble sort, selection sort.

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14

14	Program for implementation of insertion sort
15	Program for implementation of merge sort.
16	Program for implementation of quick sort.
17	Program for implementation of binary search tree and its traversal.
18	Program for implementation of graph
19	Program for implementation of BFS algorithm.
20	Program for implementation of DFS algorithm.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data Structures- A Pseudocode Approach with C	Richard F. Gilberg and Behrouz A. Forouzon	PWS Publishing Company	2nd	2004
2	Data Structures with C Schaum's Outlines Series	S. Lipschutz	Tata McGraw-Hill	-	2017
3	Data Structure using C	ReemaThareja	Oxford	2nd	2014

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data Structure using C	A. M. Tanenbaum, Y. Langsam, M. J. Augenstein	Prentice-Hall Of India Pvt. Limited	-	2003
2	Understanding Pointers in C	YashavantKanetkar	BPB Publication	1st	2009
3	C and Data Structures	N. B. Venkateshwarlu, E. V. Prasad	S. Chand and Company	-	2010
4	Let Us C	YashavantKanetkar	BPB Publication	15th	2016

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15

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Course Details:

Class	B. Tech, Sem. III
Course Code and Course Title	0CSPC252- Processor Architectures Laboratory
Prerequisite/s	0BSES109-Basic Electronic Engineering
Teaching Scheme: Practical	2
Credits	01
Evaluation Scheme: ISE / ESE	50/ 50

Course Objectives:	
1	To expose the students to architectures of basic microprocessors.
2	To understand the use of 8085 and 8086 Microprocessor instruction set.
3	To give the hands on experience on assembly language programming for microprocessors.

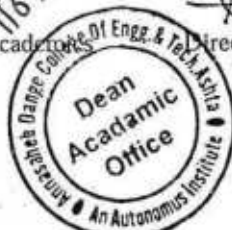| Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0CSPC252_1	**Identify** the basic elements and functions of Microprocessors.(K1)
0CSPC252_2	**Describe** the architecture of Microprocessors and its peripheral devices. (K2)
0CSPC252_3	**Design** flowchart and Data flow diagrams for 8085assembly language program for microprocessor system.(K3)
0CSPC252_4	**Proficiently** the programming techniques for developing the 8085 assembly language program in microprocessor. (S3)
0CSPC252_5	**Compare**8085 and 8086 microcomputer software and Hardware aspects, including the Microprocessor structure, and its operation and controls.(A4)

Course Contents:	
Exp No.	Title of Experiment
1	Program based on Addition Operation of two 8 bit Numbers.
2	Program based on Subtraction Operation of two 8 bit Numbers.
3	Program based on Addition Operation of two 16 bit Numbers.
4	Program based on Subtraction Operation of two 16 bit Numbers.
5	Program based on Logical Operations.
6	Program based on Branching Operations.
7	Program based on Microprocessor using Simulator.
8	Program based on 16 bit Hexadecimal numbers.
9	Program to perform one byte BCD addition..
10	Program to move a string of data Words from one offset address to another offset address.

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16

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microprocessor Architecture – programming and applications with 8085	Ramesh Gaonkar	PenramInternational	4th	2007
2	The INTEL Microprocessors - Architecture, Programming and Interfacing	Barry B. Brey Seventh Edition	PHI Ltd	8th	2010
3	Microprocessors and Microcontrollers	N. Senthi Kumar, M. Saravanan and S. Jeevananthan	Oxford University Press	2nd	2001
4	Introduction to Microprocessors and Microcontrollers	John Crisp	ELSEVIER	2nd	1998

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microcomputer system – The 8086/8088 family	Liu & Gibson	PHI	1st	2001
2	Advanced microprocessors & peripherals	A K Ray & K M Bhurchandi	Tata McGraw-Hill	2nd	2012
3	Microprocessors & Interfacing	Douglas Hall	Tata McGraw Hill	2nd	2005
4	Microprocessor 8086 : Architecture, Programming and Interfacing	Mathur Sunil	PHI Publication	4th	2011

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17

Course Details:

Class	B. Tech, Sem. III
Course Code and Course Title	0CSES253- **Programming Laboratory - I**
Prerequisite/s	0BSES112- Computer Programming, 0BSES161- Computer Programming Laboratory
Teaching Scheme: Lecture/Tutorial /Practical	2/0/4
Credits	04
Evaluation Scheme: ISE / ESE	50/50

Course Objectives:	
1	To differentiate between Procedure Oriented Languages and Object Oriented Languages.
2	To acquire features of object oriented programming language.
3	To study files, streams and Exception Handling in programs.
4	To apply advanced features of the C++ language like Standard Template Library, RTTI.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSES253_1	**Explain** the fundamentals of object oriented programming.(K2)
0CSES253_2	**Apply** the concept of class, object, array, pointers in C++. (K3)
0CSES253_3	**Apply** the concept of inheritance and polymorphism in C++. (K3)
0CSES253_4	**Apply** various library utilities and advanced features- template, STL, RTTI (K3)
0CSES253_5	**Communicate** effectively, both orally and in writing journals, (S3)
0CSES253_6	**Follow** given instructions during practical performance. (A2)

Course Contents:

Unit No.	Unit name	Contact Hrs.
Unit 1	**Fundamentals of Object Oriented Programming** The Origins of C++, Encapsulation, Polymorphism, Inheritance, Constructors & Destructors, C++ key words, Function Overloading, Operator Overloading. Classes& Objects - Relation of Classes, Structures & Union, Friend Functions, Friend Classes, Inline Functions, Parameterized constructors, Static class members, Scope resolution operators, Passing objects to functions, nested classes, and local classes.	05 Hrs.
Unit 2	**Arrays & Pointers** Arrays, Pointers, Dynamic Allocation Operators: Arrays of objects, Pointers to objects, Type checking C++ Pointers, This Pointer, Pointers to derived types, Pointers to class members, Dynamic allocation operators- new & delete operators. Function Overloading, Operator Overloading, Copy Constructors & Default Arguments: Function overloading, Overloading constructor function, copy constructors, Operator overloading using friend	06 Hrs.

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18

	function, Overloading new & delete operators, overloading some special operators like [],(),->,Comma, operator.	
Unit 3	**Inheritance:** Single Inheritance, multilevel Inheritance, multiple Inheritance, hybrid Inheritance, hierarchical Inheritance,	03 Hrs.
Unit 4	**Polymorphism-** Virtual base classes, Virtual Functions, Pure virtual function, calling virtual function through a base class, Abstract classes, Early vs Late binding.	03 Hrs.
Unit 5	**File and Streams:** Overview of C++ Stream classes, String I/O, Character I/O, Object I/O, I/O with multiple objects, File pointers and redirections. **Exception Handling:** Fundamentals, Handling derived class exceptions, exception handling options: catching, throwing.	06 Hrs.
Unit 6	**Templates:** Generic classes, Generic functions, Applying generic functions, type name & export keyword, power of templates. Namespace fundamentals, Standard Template Library: STL containers, STL algorithms, STL iterative & C++ streams, Run-Time Type ID (RTTI)	05 Hrs.

Course Content:

Perform Minimum 16-18 Experiments based on following list:

Exp. No.	Title of Experiment
1	Implement concept of switch case construct in C++ (without using object oriented concepts) and in C also.
2	Implement student grading system using class and object concept in C++.
3	Implement concept of Constructor & Destructor. (Create Object Dynamically)
4	Implement Function Overloading concept.
5	Implement Constructor Overloading concept. (All 03 types of constructor)
6	Implement program for unary Operator Overloading.
7	Implement program for binary Operator Overloading.
8	Implement Multilevel Inheritance concept.
9	Implement Multiple Inheritance concept.
10	Implement program for Hierarchical Inheritance.
11	Implement program for Hybrid Inheritance.
12	Implement Friend Function concept in C++
13	Implement Friend Class concept in C++
14	Implement Virtual Function concept in C++
15	Implement Virtual Class concept in C++
16	Implement of student database using concept of File Handling. (Read Write Operations)
17	Implement concept of Exception Handling.
18	Implement program for swapping of two numbers using Template concept in C++
19	Implement concept of bubble sort and selection sort algorithm using Function Template
20	Implement Binary Search and Linear Search algorithms using Function Template
21	Implement Stack using Class Template.
22	Implement Queue using Class Template.

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19

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	The Complete Reference: C++	Herbert Schildt,	Tata McGraw-Hill,	4th	2010
2	C++ Programming with language	BjarneStroustrup	AT & T	4th	2013
3	Programming with C++	E Balagurusammy	TMGH	4th	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Object Oriented Programming in Turbo C++	Robert Lafore	Galgotia	4th	2010
2	C++ Programming	John Thomas Berry	PHI	2nd	1992
3	Programming with C++	D. Ravichandran,	TMGH	3rd	2011
4	Test your C++ Skills	YashwantKanetkar	BPB	1st	2010

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20

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Course Details:

Class	B. Tech, Sem. III
Course Code and Course Title	0CSAC211- Communication Skills
Prerequisite/s	0BSHS156 - Professional Communication Laboratory
Teaching Scheme: Tutorial	1
Credits	-
Evaluation Scheme: ISE	50

Course Objectives:

1	To improve communicative performance of reading comprehension.
2	To enhance writing skills.
3	To improve Professional communication.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSAC212_1	Develop vocabulary to communicate effectively (S3)
0CSAC212_2	Upgrade soft skills necessary to become efficient professional (A3)
0CSAC212_3	Improve writing skills to compose emails and resume professionally (S3)
0CSAC212_4	Strengthen communicative performance in professional events (A3)
0CSAC212_5	Follow given instructions during practical performance. (A2)

Sr. No.	Name of Tutorial
01	Grammar Activity
02	Vocabulary Building Activity
03	Reading Comprehension - I
04	Paragraph Writing (Technical)
05	Resume Writing
06	Group Discussion - Technical
07	Group Discussion - Abstract
08	Elocution
09	Debate
10	Mock Interview
11	Seminar / Presentations
12	Email Writing
13	Reading Comprehension - II

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21

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Professional Communication	Dr. M. Sambaiah	Willey	1st	2017
2	High School English Grammar and Composition	NDV Prasad Rao	S. Chand	1st	2013
3	Soft Skills for Everyone	Jeff Butterfield	CENGAGE	3rd	2015
4	Business Correspondence and Report Writing	R. C. Sharma Krishna Mohan	Tata McGraw hill	2nd	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Technical English	Dr. M. Hemamalini	Wiley	-	2014
2	The ACE of softskills attitude, communication, Etiquette for success	GopalSwamy Ramesh, Mahadevan Ramesh	Pearson	1st	2011
3	Communicative English for Engineers and professionals	NitinBhatanagar, MamataBhatanagar	Pearson	2nd	2013
4	English for Technical Communication	K. R. Laxminarayan	SCITECH	2nd	2014

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22

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Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	0CSBS206- Theory of Computer Science
Prerequisite/s	0CSBS201 Discrete Mathematics
Teaching Scheme: Lecture/Tutorial	3/1
Credits	04
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

1	To introduce concepts in automata theory.
2	To identify different formal language classes and their relationships.
3	To design grammars and recognizers for different formal languages.
4	To prove or disprove theorems in automata theory using its properties.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSBS206_1	**Explain** basic terminologies related to theory of computation. (K2)
0CSBS206_2	**Construct** regular expressions and build machines to recognize those regular expressions and vice versa. (K3)
0CSBS206_3	**Demonstrate** finite state systems, build them as per the requirement and transform them into different types of finite state systems. (K3)
0CSBS206_4	**Construct** context-free grammars for languages, demonstrate derivations and parse trees for specified inputs. (K3)
0CSBS206_5	**Demonstrate** pushdown automata, its connection with context-free grammars and formulate conversion between them. (K3)
0CSBS206_6	**Demonstrate** various Turing machines for different kinds of formal languages and illustrate their variants. (K3)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Mathematical Induction, Regular Languages & Finite Automata** Proofs and Types of Proofs, Recursive Definitions, Definition & types of grammars & languages, Regular expressions and corresponding regular languages, examples and applications, unions, intersection & complements of regular languages, Finite automata-definition and representation, Non-deterministic F.A.,NFA with null transitions, Equivalence of FA's , NFA's and NFA's with null transitions.	10Hrs
Unit 2	**Kleene's Theorem** Part I & II statements and proofs, minimum state of FA for a regular language, minimizing number of states in Finite Automata	4 Hrs
Unit 3	**Grammars and Languages** Derivation and ambiguity, Union, Concatenation and *'s of CFLs, Eliminating production & unit productions from CFG, Eliminating useless variables from a context Free Grammar. CNF Notation.	7 Hrs
Unit 4	**Push Down Automata** Definition, Deterministic PDA & types of acceptance, Equivalence of CFG's	8 Hrs

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23

		& PDA's. Parsing Top Down Parsing, Recursive Descent Parsing, Bottom up Parsing	
Unit 5	**Turing Machines** Models of computation, definition of Turing Machine as Language acceptors, combining Turing Machines, Computing a function with a TM		8 Hrs
Unit 6	**Variations in Turing Machines** Turing machines with doubly-infinite tapes, more than one tape, Non-deterministic TM and Universal TM		5 Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Introduction to languages & theory of computations	John C. Martin	Tata McGraw Hill Edition	3rd	2007
2	Introduction to Automata Theory, Languages and computation	John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman	Pearson Edition	3rd	2006
3	Introduction to theory of computations	Michael Sipser	Cengage Learning	3rd	2012
4	Theory of Computation- A problem solving Approach	Kavi Mahesh	Wiley india	1st	2005

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Discrete Mathematical Structures with applications to computer science	J.P. Trembley& R. Manohar	Tata McGraw Hill Edition	-	1997
2	Elements of the Theory of Computation	Harry Lewis, Christos H. Papadimitriou	Prentice-Hall Publications	2nd	1997
3	Theory of Computation	Vivek Kulkarni	Oxford University Press	1st	2013

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24

Department of Computer Science & Engineering

Course Details:

Class	B. Tech.,Sem. IV
Course Code and Course Title	0CSPC207- Computer Networks
Prerequisite/s	0CSP203 Data Communication
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:	
1	To learn basic fundamentals concepts of computer network.
2	To recognize the features and operations of various protocols in OSI layer model.
3	To categorize and compare addressing in networking.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

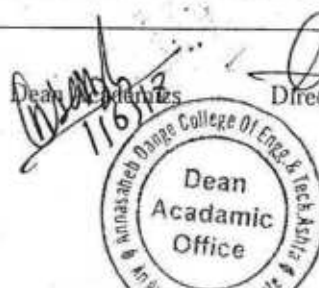| 0CSPC207_1	Explain the fundamental of computer network. (K2)
0CSPC207_2	Describenetwork protocols. (K2)
0CSPC207_3	Explain network layer design issues with routing algorithm (K2)
0CSPC207_4	Explain different protocols of transport layer. (TCP, UDP). (K2)
0CSPC207_5	Describe various utilities of application layer (K2)
0CSPC207_6	Make use of logical addressing(K3)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Computer Network Fundamentals:** Introduction to Computer Networks, Types of Network, Physical & Logical Topology , Uses of Computer Networks, Hardware Required for LAN- NIC card ,Cables, Networking Control Devices: Hub, Bridges, Switch, Routers , Repeater, Gateway, etc.	07 Hrs.
Unit 2	**Addressing and Protocols** Logical Addressing: IPV4 Addresses: IPV4-Address Space,Notation,Classful,ClasslessAddressing, Datagram, Fragmentation, Checksum, Options. IPV6 Addresses –StructureAddressSpace, PacketFormat, Extension, Advantages. AddressMapping, Unicasting and Multicasting Protocols: Internet Protocol (Header Structure, addresses, options, etc.), ARP, RARP,ICMP, IGMP	07 Hrs.
Unit 3	**Network Layer : Routing Algorithms** Network Layer Design Issues ,Routing Algorithms – Optimality Principle, Shortest Path Routing, Flooding , Distance Vector Routing, Link State Routing	07 Hrs.
Unit 4	**Transport layer**	07 Hrs.

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	The transport service, Elements of transport protocols, Internet transport protocol TCP-FrameFormat,Services,Features,Connection,Flow&ErrorControl. UDP- FrameFormat,operation, Userdatagram, Checksum	
Unit 5	**Application Layer: DNS, FTP** DNS :Name space, Domain Name Space, DNS in the Internet, Resolution, DNS message, Remote Login (SSH), FTP: Control connection and Data connection	07 Hrs.
Unit 6	**Application Layer Protocols** SMTP: Architecture, User Agent, Message Transfer phases and MIME, WWW: Architecture , Web Documents& HTTP, SNMP: Concepts, Management Components, SMI and MIB	07 Hrs.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Data Communications and Networking	Behrouz A Forouzan	Tata McGraw-Hill	4th	2012
2	Computer Networks	Andrew S. Tanenbaum	Prentice Hall	5th	2011
3	TCP/IP protocol suite	B A Forouzan	TMGHill	4th	2010

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Data & computer communications	William Stallings	Pearson Education	8th	2011
2	Data communication and computer Networks	Ajit Pal	PHI.Learning	1st	2014
3	Computer Networking : Principles, Technologies and protocols of network design	Natalia Olifer and victor Olifer	Wiley India Edition	1st	2009

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26

Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	OCSPC208- Operating System-I
Prerequisite/s	OBSES112 Computer Programming
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

1.	To learn basic concepts of operating system
2.	To introduce various process management concepts including scheduling, synchronization and deadlocks.
3	To learn various resource allocation methodsand solve memory management problems.
4	To know basic concepts of file handling methods and I/O subsystem.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

OCSPC208_1	**Explain** basic concepts of operating system, system structure, services, and operations(K2)
OCSPC208_2	**Illustrate** process, thread scheduling algorithm and interprocess communication(K2)
OCSPC208_3	**Explain** basic concepts of file handling and I/O subsystem (K2)
OCSPC208_4	**Apply** appropriate solution to solve critical section problem (K3)
OCSPC208_5	**Solve** deadlock problems (K3)
OCSPC208_6	**Apply** memory management strategies for various page replacement policies. (K3)

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	**Overview** Introduction to Operating Systems, System structures, what operating systems do, Computer System organization, Computer system architecture, Operating System structure, operating System operations, Types of Operating Systems, Operating System Services, User - Operating System interface, System calls, Types of system Calls, System programs, Kernel, Types of kernel.	06 Hrs.
Unit 2	**Process Management** Process concept: Process scheduling, Operations on processes, Inter-process communication, Multi-Threaded Programming: Overview, Multithreading models, Thread Libraries, Threading issues. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-Processor scheduling, Thread scheduling.	09 Hrs.

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Unit 3	**Process Synchronization** Background, the critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of Synchronization	06 Hrs.
Unit 4	**Deadlock** System model, deadlock characterization, methods for handling deadlocks, deadlock preventions, deadlock avoidance, deadlock detection, deadlock recovery.	07 Hrs.
Unit 5	**Memory Management** Memory Management Strategies: Background, swapping, contiguous memory allocation, paging, structure of the page table, Segmentation. Virtual Memory Management: Background, demand paging, copy-on-write, page replacement,	07 Hrs.
Unit 6	**Storage Management& I/O Subsystem** File System: File concept, access methods, directory and disk structure, file-system mounting, file sharing, protection, Overview of I/O system, I/O hardware, Application I/O interface, Kernel I/O subsystem.	07 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Operating System Concepts Gagne	Silberschatz, Galvin,	John Wiley	8	2009
2	Operating Systems - A Concept Based approach	Dhananjay M Dhamdhere	Tata McGraw Hill	3	2007
3	Understanding Operating System	Understanding Operating System	Ann McHoes& Ida M. Flynn, (Thomson)	6	2014

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Operating System A Design Oriented Approach	Charles Crowley	Tata McGraw Hill	1	2001
2	Operating System with Case Studies in Unix, Netware and Windows NT	Achyut S. Godbole	Tata McGraw Hill	5	2007
3	Operating Systems: Internals and Design Principles	William Stallings	Pearson Education International	8	2014

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28

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Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	0CSPC209- Software Engineering
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial	3/0/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:	
01	To expose basic concepts and principles of software engineering to students.
02	To create awareness amongst students about the importance of software development life cycle in project development.
03	To expose software testing techniques and software quality management standards to students.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPC209_1	Illustrate basic concepts and principles of software engineering. (K2)
0CSPC209_2	Explain analysis, planning & requirement specifications of software project development. (K2)
0CSPC209_3	Construct structure & function oriented design for software project development. (K3)
0CSPC209_4	Experiment withvarious software coding and testing techniques to enhance the quality, cost & efforts of software. (K3)
0CSPC209_5	Describe standards related to software reliability and quality management. (K2)

Course Contents:

Unit No.	Unit Name	Contact Hrs
Unit 1	**Software Processes** Software Process, Desired Characteristics of Software Process, Software Development Process Models, Other Software Processes, Agile software development - Agile methods, Plan-driven and agile development, Extreme programming, Scaling agile methods	07 Hrs
Unit 2	**Software Requirements Analysis and Specification** Software Requirement, Problem Analysis, Requirements Specification, Functional Specification with Use Cases, validation, metrics, Distributed software engineering	06 Hrs
Unit 3	**Planning a Software Project** Process Planning, Effort Estimation, Project Scheduling and Staffing, Software Configuration Management Plan, Quality Plan, Risk Analysis &Management, Project Monitoring Plan, Configuration management	08 Hrs

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Unit 4	**Function Oriented Design** Design Principles, Module-Level Concepts, Design Notation and Specification, Structured Design Methodology, Verification	07 Hrs
Unit 5	**Coding and Testing** Programming Principles and Guidelines, Coding Process, Testing Fundamentals, Black-Box Testing, White-Box Testing, Testing Process, Defect Analysis and Prevention, Metrics—Reliability Estimation	09Hrs
Unit 6	**Software Reliability and Quality Management** Software Reliability, Statistical testing, Software Quality, Software Quality Management System, ISO 9000, SEI CMM , The CMMI process improvement framework	05 Hrs

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	An integrated approach to S/W engineering	PankajJalote	Narosa Publishers	3rd	2011
2	Fundamentals of Software Engineering	Rajib Mall	PHI	3rd	2009
3	Software Engineering	Jawadekar W.S.	TMGH	7th	2007

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Software Engineering	Ian Sommerville	Pearson	10th	2016
2	Software Engineering: Practitioner's Approach	Roger S. Pressman	McGraw Hill	7th	2010
3	Software Engineering principles and practices	RohitKhuran	Vikas Publishing House Pvt. ltd	2nd	2010

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30

Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	0CSPC210-Computer Architecture
Prerequisite/s	0CSPC205-Processor Architectures
Teaching Scheme: Lecture	3/0/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:	
1	To expose basic concepts of computer organization to students
2	To make the students aware of overall design, arithmetic and memory organization
3	To study different types of architecture

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPC210_1	**Explain** computer evolution and basics of computer organization (K2)
0CSPC210_2	**Solve** different arithmetic operations (K3)
0CSPC210_3	**Illustrate** control design and memory organization (K2)
0CSPC210_4	**Explain** concepts of parallel processing and vector processing (K2)
0CSPC210_5	**Explain** different computer architectures (K2)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Basic Computer Organization** Evolution of computers - Mechanical era, Electronic computers, CPU organization, Data representations, Instruction Sets, RISC & CISC, definition, comparison and examples	06 Hrs.
Unit 2	**Computer Arithmetic:** Number representation : Signed Integers, Fixed point numbers, Floating point numbers, Multipliers and Dividers, Floating point arithmetic's: Rounding Modes, Special Value and Exceptions, floating point addition, other Floating point operations, Booth's Algorithm, IEEE Standards for Floating point representations (Single Precision Format)	9 Hrs.
Unit 3	**Control Design and memory organization:** Basic concepts, Hardwired control Unit, Microprogrammed control unit, Memory Technology, Memory Systems, Caches: Main features	06 Hrs.
Unit 4	**Introduction to Parallel Processing :** Introduction, architectural classification schemes. Evolution of parallel processors, current & future trends towards parallel processors, Principles of pipelining and array processing, Scalar and vector pipelines, Classification of pipelined processors, performance evaluation factors. Vector processing concepts, Systolic arrays and their applications	8 Hrs.
Unit 5	Different parallel processing architectures:	06 Hrs.

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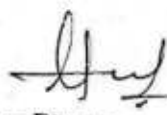
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31

	Introduction to Associative memory processors, Principles of multithreading, Latency hiding techniques, Scalable coherent multiprocessor model with distributed shared memory.	
Unit 6	**Distributed Memory Architecture :** Loosely coupled and tightly coupled architectures, Cluster computing as an application of loosely coupled architecture. Examples –CM* Dataflow Architectures: Concepts of data flow computing, static and dynamic dataflow architectures. Dataflow	7 Hrs.

Text Books:

| Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Computer Architecture and Organization (Unit 1,3)	John P Hayes	McGraw-Hill	3	2005
2	Computer Architecture (Unit 2)	BehroozParhami	Oxford University Press	1	2006
3	Computer Architecture and parallel processing (Unit 4, 5,6)	Kai Hwang and Faye A Briggs	McGraw-Hill	1	2010
4	Advanced computer architecture (Unit 4,5,6)	Kai Hwang	McGraw-Hill	1	2012

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Computer Systems Organization and Architecture	John D. Carpinelli	Pearson Education	3	2008
2	Parallel Computer Architecture	David E. Culler	Morgan Kaufmann Publishers	1	2005
3	Advanced Computer Architecture: A Design Space Approach	DezsoSima, Terence Foundation, Peter karsuk	Pearson	2	2010
4	Computer Architecture: A Quantitative Approach	John L. Hennessy &Devid A. Patterson	Morgan Kaufmann Publishers	3	2003
5	Computer Organization	Carl Hamacher, ZvonkoVranesic, SafwatZaky	McGraw-Hill	5	2002

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NDCET   **Department of Computer Science & Engineering**
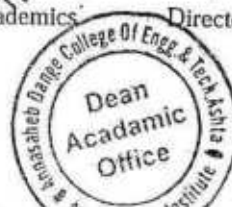
Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	0CSPC254- Operating System-I Laboratory
Prerequisite/s	0BSES161 Computer Programming Laboratory
Teaching Scheme: Practical	2
Credits	01
Evaluation Scheme: ISE / ESE	25/ 50

Course Objectives:

1.	To expose installation process of operating system and various functions of the operating system and their usage to students.
2.	To provide necessary skill for developing and debugging programs in Linux and Unix environment.
3.	To make the student aware of various types of CPU scheduling and compare various algorithms to solve problem occurred in deadlock and critical section.
4.	To give hands on exposure to UNIX commands and system calls.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC254_1	Demonstrate the installation and various features of operating systems. (K2)
0CSPC254_2	Identify CPU scheduling algorithms and resolve problems related to deadlock, critical section. (K3)
0CSPC254_3	Test for appropriate commands on Unix, Linux platform and identify their use to perform various operations. (K4)
0CSPC254_4	Debate on various commands and standard libraries in the operating system. (A3)
0CSPC254_5	Proficiently Develop and debug, C programs created on Linux and Unix platforms(S3)

Course Contents:

Exp. No.	Title of Experiment
1.	Installation of windows operating system.
2.	Installation of Linux operating system.
3.	Program based on CPU Scheduling Algorithms.
4.	Program based on Bankers algorithm for Deadlock Avoidance.
5.	Program based on Bankers Algorithm for Deadlock Prevention.
6.	Program based on Page Replacement Policies.
7.	Program based on various system calls of UNIX operating system.
8.	Program based on various I/O System calls of UNIX operating System.
9.	Program based on various UNIX commands.
10.	Program to solve Producer-Consumer problem using semaphores (Using UNIX system calls)

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33

Department of Computer Science & Engineering

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	The design of Unix Operating System	Maurice J. Bach	PHI Publication	1	2006
2	A practical Guide to Linux commands, Editors and shell programming	Mark G. Sobell	Pearson Education India	3	2013
3	Operating Systems concepts and design	Milan Milenkovic	TMGH	2	2001

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Linux System Programming	Robert Love	SPD, O' REILLY	2	2007
2	Unix concepts and administration	Sumitabha Das	TMGH	4	2006
3	A practical Guide to Unix system V	Mark G. Sobell	Benjamin cummings Pub.	2	2005

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34

Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	0CSPC255- Computer Networks Laboratory
Prerequisite/s	0CSPC203Data Communication 0BSES161 Computer Programming Laboratory
Teaching Scheme: Practical	2
Credits	01
Evaluation Scheme: ISE / ESE	25/ 50

Course Objectives:

1	To correlate theoretical and practical knowledge in computer networks
2	To learn network protocols.
3	To provide basic skills needed to write network application using socket interface.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC255_1	**Identify** various internetworking devices. (K3)
0CSPC255_2	**Apply** principles and mechanisms for data exchange among computers. (K3)
0CSPC255_3	**Make use of** different network layer protocols to formulate and solve network problems. (K3)
0CSPC255_4	**Propose** LAN Design and make use of various network troubleshooting commands.(A3)
0CSPC255_5	**Utilize** various networking protocols for data transfer.(S3)

Exp. No.	Title of Experiment
1	Demonstrate topologies of Computer Networks along with its types.
2	Configure and organize networking control devices.
3	Design Network cross-wired cable using crimping tool.
4	Design Network straight through cable using crimping tool.
5	Make use of Network configuration and troubleshooting commands.
6	Design a LAN by Configuring Host IP, Subnet Mask and Default Gateway of System.
7	Implementation of Dijkstra's Shortest Path Routing algorithm.
8	Implementation of a file transfer application using TCP Socket program
9	Implementation of a file transfer application using UDP Socket program
10	Develop FTP Configuration for transfer files between systems in LAN.
11	Install Print server in a LAN and share the printer in a network.
12	Installation of network analyzer tool (Wireshark).

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35

13	Make use of packer tracer tool for analyze network
14	Case study: To study network of any organization and submit report.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Data Communications and Networking	Behrouz A Forouzan	Tata McGraw-Hill	4th	2012
2	Computer Networks	Andrew S. Tanenbaum	Prentice Hall	5th	2011
3	TCP/IP protocol suite	B A Forouzan	TMGHill	4th	2010

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Data & computer communications	William Stallings	Pearson Education	8th	2011
2	Data communication and computer Networks	Ajit Pal	PHI Learning	1st	2014
3	Computer Networking : Principles, Technologies and protocols of network design	Natalia Olifer and victor Olifer	Wiley India Edition	1st	2009

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36

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Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	OCSES256-Programming Laboratory II
Prerequisite/s	OCSES253 Programming Laboratory -I
Teaching Scheme: Theory / Tutorial / Practical	2/0/4
Credits	04
Evaluation Scheme: ISE / ESE	50 / 50

Course Objectives:	
1	To develop java programming skills
2	To understand inheritance, Packages and Exception handling.
3	To understand and make use of various approach to design GUI and I/O operations.
4	To implement Multi-threading and Networking concepts.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

OCSES256_1	Developsuitable logic to solve problems using Java. (K3)
OCSES256_2	Apply various object oriented features of Java (K3)
OCSES256_3	Develop programs using Applet and Swing with database connectivity (K3)
OCSES256_4	Make use of Multi-threading, I/O operations and Networking to solve problems. (K3)
OCSES256_5	Formulate and design solution and debug programs Java Programming Language.(A4)
OCSES256_6	Proficientlyusejava programming to solve problems.(S3)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Fundamental Programming in Java** Object-Oriented Programming Concepts, JVM, JIT Compiler, Byte Code,, A Simple Java Program, Source File Declaration Rules, Comments, Data Types, Variables, Operators, Strings, Input and Output, Arrays- Jagged Array. Objects and Classes: Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing Information to a Method or a Constructor, Creating and using objects, Access Modifiers, Static Fields and Methods, this keyword.	04 Hrs.
Unit 2	**Inheritance, Interface and Packaging** Inheritance: Definition, Types of Inheritance, Polymorphism, Overriding and Hiding Methods, Super keyword, Final Classes and Methods, Abstract Classes and Methods, casting, finalization and garbage collection. Interfaces: Defining an Interface, Implementing an Interface, Using an Interface as a Type.	05 Hrs.

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37

	Packages: Class importing, Creating a Package, Naming a Package, Using Package Members, Developing and deploying (executable) Jar File.	
Unit 3	**Exception and I/O Streams** Exception: Definition, Dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, finally clause, I/O Streams: Byte Stream – InputStream, OutputStream, DataInputStream, DataOutputStream, FileInputStream, FileOutputStream, Character Streams, BufferedStream, File, RandomAccesFile.	05 Hrs.
Unit 4	**Graphical User Interfaces using Swing:** Introduction to the Swing, Swing features, Swing Top Level Containers-Creating a Frame, Positioning a Frame, Displaying Information in a Panel, The Model-View-Controller Design Pattern, The JComponent Class – Jlabel, JTextField, JButton etc. Layout Management: Border Layout, Flow Layout, Grid Layout Event Handling: Basics of Event Handling, The AWT Event Hierarchy, Key Events, Mouse Events, Introduction to JApplet.	05 Hrs.
Unit 5	**Networking and Multithreading** Multithreading: Processes and Threads, Runnable Interface and Thread Class , Defining and Starting a Thread, Thread States, Thread Properties, Networking: Overview of Networking, Networking Basics, Reading from and Writing to a URL Connection, Sockets, Reading from and Writing to a Socket, Writing a Datagram Client and Server.	05 Hrs.
Unit 6	**Collection and Database Programming** Collections: Collection Interfaces, Concrete Collections- List, Queue, Set, Map, the Collections Framework. Database Programming: The Design of JDBC, The SQL, Basic JDBC Programming Concepts, Query Execution, Result Sets	04 Hrs.

Course Content:
Perform Minimum 16-18 Experiments based on following list:

Exp. No.	Title of Experiment
1	Program based on Variables, Operators, Strings, Input and Output.
2	Program based on concept of Class and Object.
3	Program based on concept of Overloading.
4	Program based on Static Fields and Static Methods.
5	Program based on concept of Inheritance like single inheritance, multilevel inheritance, hierarchical inheritance etc.
6	Program based on Multiple inheritance using Interface.
7	Program based on concept of Polymorphism.
8	Program based on concept of super keyword, final classes and final methods.
9	Program based on Abstract classes and methods.
10	Program based on Multiple inheritance using Interface.
11	Program based on concept of Package and sub packages

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38

	productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation. Western Ghat as a biodiversity region. Hot-spots of biodiversity. Threats to biodiversity habitat loss, poaching of wildlife, man-wild life conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	
Unit 5	**Environmental Pollution** Definition: Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.	04 Hrs.
Unit 6	**Social Issues and the Environment** Disaster management: floods, earthquake, cyclone, tsunami and landslides Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products.	03 Hrs.
Unit 7	**Environmental Protection** From Unsustainable to Sustainable development Environmental Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Population Growth and Human Health, Human Rights	06 Hrs

Mini Project	**Mini project based on :** Environmental assets River/Forest/Grassland/Hill/Mountain. OR A local polluted site Urban/Rural/Industrial/Agricultural. OR Study of common plants, insects, and birds. OR Study of simple ecosystems - ponds, river, hill slopes, etc. **(Mini Project report is Mandatory.)**

Assessment Method:

1. Mini Project report – 10 marks
2. ISE question paper format will be Multiple Choice Questions- 40 Marks

Unit No.	Topic Name	Weightage
1	Nature of Environmental Studies.	4 Marks
2	Natural Resources.	7 Marks
3	Ecosystems	7 Marks
4	Biodiversity and its conservation	7 Marks
5	Environmental Pollution	7 Marks
6	Social Issues and the Environment	8 Marks

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39

Course Details:

Class	B. Tech, Sem.-III/IV
Course Code and Course Title	0CSMC212, Environmental Studies
Prerequisite/s	--
Teaching Scheme: Lecture	02
Credits	--
Evaluation Scheme: ISE	50

Course Outcomes (COs)
Upon successful completion of the course students will be able to:

0CSMC212_1	Explain importance of environmental studies with necessary of acts.(K2)
0CSMC212_2	Explain importance of public awareness on environmental problems (K2)
0CSMC212_3	Write a technical report in team regarding course and impacts of environment related issues.(S2)
0CSMC212_4	Discuss current concern of environment issues.(A2)
0CSMC212_5	Describe the need of environment protection and ethics.(A2)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Nature of Environmental Studies** Definition, scope and importance. Multidisciplinary nature of environmental studies, Need for public awareness.	02 Hrs.
Unit 2	**Natural Resources and Associated Problems** a) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people; b) Water resources: Use and over-utilization of surface and groundwater, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewable and non renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy, f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.	04 Hrs.
Unit 3	**Ecosystems** Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem :- a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem d)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	04 Hrs.
Unit 4	**Biodiversity and its conservation** Introduction- Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use,	05 Hrs.

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40

Department of Computer Science & Engineering

Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	0CSPR257-Mini Project
Prerequisite/s	-
Teaching Scheme: Practical	2
Credits	1
Evaluation Scheme: ISE / ESE	25 / 25

Course Objectives:

1	To design, develop and implement a group project.
2	To prepare a detailed project report for submission and evaluation.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPR257_1	Developsuitable logic to solve a real world problem and its requirements(K3)
0CSPR257_2	Developa design solution for a set of requirements(K3)
0CSPR257_3	Make use ofTesting to validate the conformance of the developed prototype against the original requirements of the problem(K3)
0CSPR257_4	Work as a responsible member and possibly a leader of a team in developing software solutions(A4)
0CSPR257_5	Proficientlylearn new tools, algorithms, and/or techniques that contribute to the software solution of the project(S3)

Course Content:

1	Three to four students (Maximum) in a group shall carry out a mini project. Student in consultation with their guide can select a project topic based on concepts studied in this or previous semester.
2	Alternatively, a group may select another topic of relevance in consultation with guide or other department faculties.
3	Periodic assessment shall be carried out by panel of faculties. Panel shall comprise of Head of department, project guide and 2 other senior faculty member of the department. ISE evaluation shall be carried out based on periodic assessments.
4	Project group shall submit hardcopy project report along with project demonstration software in CD and/or project hardware gadget at the term end.

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41

12	Program based on concept of Exception and custom exception
13	Program based on file read write
14	Program to develop GUI using swing.
15	Program to develop GUI using JApplet
16	Program based on Layout Management.
17	Program based on concept of Key and mouse event.
18	Program based on Socket programming using Swing GUI.
19	Program based on threading.
20	Program based on Database.
21	Program to demonstrate Collection classes.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Core Java- Volume I Fundamentals	Cay Horstmann	Pearson	8th	2011
2	Core Java- Volume II Advanced Features	Cay Horstmann, Gary Cornell	Pearson	8th	2011
3	Let Us Java	YashavantKanetkar	BPB Publication	3rd	2017

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Java 2 Complete Reference	Herbert Schildt	TMGH	9th	2014
2	JAVA HOW TO PROGRAM	Deitel Paul , Deitel Harvey	PHI Learning	10th	2016
3	Thinking in Java	Bruce Eckel	Prentice Hall	4th	2006
4	A Programmer's guide to JAVA SCJP Certification	Khaleed Mughal and Rolf W. Rasmussen	Addison Wesley	3rd	2008

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42

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Environmental Studies	Dr. B. S. Chauhan	University Science Press, New Delhi	1st	2008
2	Environmental Studies	Dr. P. D. Raut	S. U. Kolhapur	3rd	2011

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Principals of Environmental Science and Engineering	Raman Sivakumar	Cengage learning Singapore	2	2005
02	Elements of Environmental Science and Engineering	P. Meenakshi	Prentice Hall of India Private Limited, New Delhi	-	2006
03	Environmental Science – working with the Earth	G. Tyler Miller Jr	Thomson Brooks /Cole	11	2006

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43

Annasaheb Dange College of Engineering and Technology, Ashta

(An Autonomous Institute affiliated to Shivaji University, Kolhapur.)

Structure and Curriculum

T. Y. B. Tech.
COMPUTER SCIENCE AND ENGINEERING

SEM V & SEM VI

(Academic Year 2019-20)

TY CS—0154

B. Tech Semester V
Teaching and Evaluation Scheme

Course Code	Course	Teaching Scheme				Evaluation Scheme				
							Theory Marks		Practical Marks	
		L	T	P	Credits	Scheme	Max.	Min. for Passing	Max.	Min. for Passing
0CSPC301	Internet of Things	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC302	Computer Algorithms	3	0	0	, 3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC303	System Software	3	1	0	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC304	Information and Network Security	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC305	Database Engineering	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC351	Computer Algorithms Laboratory	0	0	2	1	ISE			50	20
0CSPC352	Database Engineering Laboratory	0	0	4	2	ISE			50	20
						ESE	POE		50	20
0CSPE3**	Professional Elective- I	2	0	2	3	ISE			50	20
						ESE	POE		50	20
0CSPR356	Theme Based Mini Project	0	0	2	1	ISE			50	20
						ESE	OE		50	20
0CSAC314	Entrepreneurship Development and Planning	2	0	0	-	Grades				
Total		19	1	10	23		500		350	
Total Contact Hours/Week: 30hrs										

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TYCS - 02|54

Professional Elective – I
1. Advanced Programming   - 53
2. Software Testing and Quality Assurance - 54
3. Network Administration – 55

Course Category	HS	BS	ES	PC	PE	OE	PR
Credits	-	-	-	19	3	-	1
Cumulative Sum	3	28	37	45	3	-	2

HOD

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TYCS 03/44

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPC301- Internet of Things
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

01	To learn Internet of Things Technology
02	To know the basics of RFID and Sensor technologies
03	To aware students about wireless technologies and IoT applications.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC301_1	Describe fundamental mechanisms of Internet of Things. (K^2)
0CSPC301_2	Describe components and working of RFID technology. (K^2)
0CSPC301_3	Design applications of Internet of Things. (K^3)
0CSPC301_4	Explain protocols related to wireless technologies. (K^2)
0CSPC301_5	Explain components needed to prototyping an Internet of Things application. (K^2)

Course Contents:

Unit 1	Basics of IoT What is the Internet of Things? : History of IoT, About objects/things in the IoT, Overview and motivations, IoT Application examples: Smart Metering advanced metering infrastructure, e-Health/Body area network, City automation, and automotive applications. Home automation, smart cards, Tracking, over-the-air passive surveillance/Ring of steel, Control application examples. IoT definitions, IoT Frame work, General observations, ITU-T views, working definitions, Basic nodal capabilities	07 Hrs.
Unit 2	Fundamental IoT mechanisms & key technologies Identification of IoT objects and services, Structural aspects of the IoT, Environment Characteristics, Traffic characteristics ,scalability, Interoperability, Security and Privacy, Open architecture, Key IoT Technologies ,Device Intelligence, Communication capabilities, Mobility support ,Device Power, Sensor Technology, RFID technology, Satellite Technology.	05 Hrs.
Unit 3	Radio Frequency Identification Technology Radio Frequency Identification Technology: Introduction, Principles of RFID, Components of an RFID system, Reader, RFID tags, RFID middleware, Issue. Wireless Sensor Networks: History and context, The node, connecting nodes, networking nodes, securing communication.	09 Hrs.
Unit 4	Wireless technologies for IoT : layer ½ connectivity WPAN Technologies for IoT/M2M, Zigbee /IEEE 802.15.4, Radio Frequency for consumer Electronics (RF4CE), Bluetooth and its low-energy profile , IEEE	06 Hrs.

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TYCS-04154

		802.15.6 WBANS, IEEE 802.15 WPAN TG4j,MBANS,NFC,dedicated short range communication(DSRC) & related protocols. Comparison of WPAN technologies cellular & mobile network technologies for IoT/M2M.	
Unit 5	Prototyping **Thinking about prototyping:** Sketching, familiarity, Costs versus Ease of Prototyping, Prototypes and Production, Open Source versus Closed Source **Prototyping Embedded Devices:** Electronics: Sensors, Actuators, Scaling up the Electronics; Embedded computing basics, Arduino, Raspberry Pi	07 Hrs.
Unit 6	**IoT Physical Devices and Endpoints** Python packages, JSON, XML, HTTPLib, URLLib, SMTPLib, and Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming, Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, and reading input from pins.	08 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Internet of Things, Connecting Objects to the Web	HakimaChaouchi	Wiley Publications	1st edition	2010
02	Building the Internet of Things with IPv6 and MIPv6 The Evolving World of M2M Communications	Daniel Minoli	Wiley Publications	1st edition	2015
03	Designing the Internet of Things	Adrian McEwen, hakim Cassimally	Wiley	Reprint	2015
04	Getting Started with Raspberry Pi	Matt Richardson, Shawn Wallace	O'Reilly SPD	1st edition	2014

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Architecting the Internet of Things	Bernd Scholz-Reiter, Florian Michahelles	ISBN 978-3842-19156-5, Springer.	1st	2011
02	The Internet of Things: Key Applications and Protocols	Olivier Hersent,DavidBoswarthick, Omar Elloumi	ISBN 978-1-119-99435-0, Wiley Publications.	2nd	2012
03	Internet of Things, A Hands on Approach	Arshdeep Bahga, Vijay Madisetti	University Press,	1st edition.	2015
04	"Sensors Handbook",	Sabrie Soloman,	McGraw Hill,	2nd edition	2015

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TYCS-05/54

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPC302- Computer Algorithms
Prerequisite/s	0CSPC202
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

01	To study fundamental concepts and notations used in algorithm design.
02	To familiarize with different design strategies and their analysis.
03	To develop skills to solve real life applications involving algorithm development.
04	To use graph based approaches for problem solving.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC302_1	Explain different design methods of algorithm. (K^2)
0CSPC302_2	Explain solvability, unsolvability of a problem and computational models of parallel algorithm. (K^2)
0CSPC302_3	Apply different design methods of algorithm. (K^3)
0CSPC302_4	Apply different search techniques for efficient graph traversal. (K^3)
0CSPC302_5	Analyze complexity of different algorithm designs. (K^4)

Course Contents:

Unit 1	**Divide and Conquer Method** Recurrence Equations and their solution, Randomized Algorithms, The general method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, Selection, Convex Hull.	08 Hrs.
Unit 2	**The Greedy Method** The general method, Knapsack problem, Job sequencing with deadlines, minimum-cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes, Graph coloring problem, Single source shortest path.	06 Hrs.
Unit 3	**Dynamic Programming** The general method, Multistage graphs, All pair shortest paths, Optimal binary search trees, 0/1 knapsack, Reliability design, Traveling Sales person problem.	07 Hrs.
Unit 4	**Basic Traversal and Search Techniques** Techniques for Graphs, AND/OR graphs, Connected components and Spanning Trees, Biconnected components and depth first search	07 Hrs.
Unit 5	**Backtracking and Infeasibility** **Backtracking:** The general method, 8-queen problem, sum of subsets, Hamiltonian Cycle, Graph Coloring **Infeasibility:** P and NP-classes, NP-hard problems	09 Hrs.
Unit 6	**Parallel Computational models** PRAM, MESH, HYPERCUBE - Fundamental Algorithms	05 Hrs.

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fundamentais of Computer Algorithms	Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaran	University Press	2nd	2008
02	Introduction to Algorithms	Thomas Cormen, Charles Leiserson, Ronald RIvest, Clifford Stein	PHI	3rd	2009
03	Algorithms in a Nutshell	G. T. Heineman, G. Pollice, S. Selkow	O'Reilly	1st	2008
04	Fundamentals of algorithms	G. Brassard, P. Brately	Pearson Education	1st	2015

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Design and Analysis of Algorithms	Aho, Hopfcraft and Ullman	Pearson Education	1st	2000
02	Algorithms	Kenneth Berman, Jerome Paul	CENAGE Learning	1st	2010
03	Algorithms	Robert S., Kevin W.	Pearson Education	4th	2014
04	Introduction to Design and Analysis of Algorithms	Anany Levitin	Pearson Education	1st	2008

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TYCS-07|54

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPC303- System Software
Prerequisite/s	0CSPC205, 0CSBS207
Teaching Scheme: Lecture/Tutorial	3/1
Credits	04
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

01	To expose the students to the fundamentals of language and processing
02	To make students to learn design of grammars, assemblers and compilers
03	To introduce the fundamentals of compilers and their phases.
04	To expose the students to the fundamentals of Linkers and Loaders

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC303_1	**Explain** the fundamentals of language processing. (K^2)
0CSPC303_2	**Design** an assembler and macro preprocessor. (K^3)
0CSPC303_3	**Identify** a language processor for specific needs. (K^3)
0CSPC303_4	**Explain** various stages of compiler construction. (K^2)
0CSPC303_5	**Design** a parser using different techniques. (K^3)

Course Contents:

Unit 1	**Language Processors** Introduction, language processing activities, Fundamentals of language processing, Toy Compiler, Fundamentals of language Specifications	06 Hrs.
Unit 2	**Assemblers and Interpreters** Elements of assembly language programming, a simple assembly scheme, pass structure of assemblers, design of a two pass assembler, Interpreters	09 Hrs.
Unit 3	**Macros and Macro preprocessors** Macro definition and call, Macro Expansion, Nested macro calls, Advanced macro facilities Design of macro preprocessor	06 Hrs.
Unit 4	**Linkers** Relocation and linking concepts, design of a linker, Self-relocating programs, linking for overlays, Loaders.	05 Hrs.
Unit 5	**Introduction to Compiling** Compilers, Phases of a compiler, Compiler construction tools Lexical Analysis: Role of a Lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications, designing a lexical analyzer generator.	06 Hrs.
Unit 6	**Syntax Analysis and Code Generation** Role of Parser, Top- down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers	10 Hrs.

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	models, Syntax directed definitions, Code Optimizing transformations, Issues in design of Code Generation	

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	System Programming	D M Dhamdhere	Tata McGraw-Hill	First Reprint	2011
02	System Programming and Operating System	D M Dhamdhere	Tata McGraw-Hill	2	2006
03	Compilers - Principles, Techniques and Tools	A.V. Aho, R. Shethi and J.D. Ullman	Pearson Education	1	1999
04	Crafting A Compiler with C	Charles Fischer, Richard LeBlanc	Pearson Publication	1	2007

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Compiler Construction-Principles and Practices	Kenneth C.Louden	Vikas Publication House	1	2003
02	Compiler Construction using Java, Javacc and Yacc	A. J. DosReis	Wiley	1	2015
03	System Programming	J. J. Donovan	Tata McGraw-Hill	1	2001
04	Writing compilers and Interpreters	Ronald Mak	Wiley	3	2015

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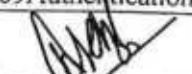TTCS-09|54

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPC304- Information and Network Security
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

01	To introduce Information security services and mechanisms to the students.
02	To make students aware the security services widely used in Internet and Web services.
03	To give hands on exposure to various security tools and techniques.
04	To analyze the various security measures in IT sector

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC304_1	Infer need of security for information and classical encryption techniques .(K^2)
0CSPC304_2	Make use of Symmetric and asymmetric encryption algorithms. (K^3)
0CSPC304_3	Analyze algorithm for data encryption standards, Key generation and transmission etc.(K^4)
0CSPC304_4	Identify Techniques for email, IP and web security (K^3)
0CSPC304_5	Illustrate threats to system or application security and their counter measures (K^2)

Course Contents:

Unit 1	**Symmetric Ciphers:** Overview - Services, Mechanism and Attacks, The OSI security Architecture, A model for Network security. Classical Encryption techniques-Symmetric Cipher model, Substitution techniques, Transposition techniques, Rotor Machines, Steganography.	07 Hrs.
Unit 2	**Block Cipher and Data Encryption Standard :** Block Cipher and Data Encryption Standard-Simplified DES, Block cipher principles, The Data Encryption Standard, The strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles, block cipher modes of operations.	07 Hrs.
Unit 3	**Asymmetric Ciphers** Public Key Cryptography and RSA-Principles of Public Key Crypto systems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Digital Signature, Hash Function.	07 Hrs.
Unit 4	**Network Security Practice** AuthenticationApplications-Kerberos,X.509AuthenticationService,ElectronicMailSecurity- Pretty Good	10 Hrs.

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		Privacy- Notation, operational description, S/MIME- overview, functionality, IP Security – IP Security Overview, IP Security Architecture, WEB Security - Web Security Considerations, Secure Electronic Transaction overview.	
Unit 5	**System Security** Intruders-Intruders, Intruder detection, Password Management, Malicious Software-Viruses and Related Threats, Virus Countermeasures, Firewall- Firewall Design principles, Trusted systems.		06 Hrs.
Unit 6	**Applications of Cryptography and Security** Cryptographic solutions a case study, Single Sign On (SSO), Secure Inter-Branch Payment Transactions, Denial of Services (DOS) Attacks, IP Spoofing Attacks		05 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year
01	Cryptography and Network security Principles and Practices	Williams Stallings	Pearson India	6	2014
02	Security in Computing	Charles P. Pfleeger	PEARSON	4	2009
03	Cryptography and Network Security	AtulKahate	Tata McGraw - Hill Education	2	2007
04	Network Security Essentials	Williams Stallings	Pearson India	6	2018

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Cryptography and Security	C. K. Shyamala	Wiley	1	2011
2	Information Systems Security	Nina Godbole	Wiley	1	2008
3	Cryptography and Network Security	Behrouz A. Forouzan	Mcgraw Higher Education	3	2016
4	Applied Cryptography	BruiceSchneier	Wiley	2	2006

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Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPC305- Database Engineering
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

01	To enable the students to understand various functional components of database system and basic concepts of conceptual database design.
02	To give the students insight of using conceptual designs to prepare database schemas to solve real-world problems.
03	To make the students understand relational model and the theoretical issues associated with relational database design.
04	To make the students learn SQL and to understand fundamentals of indexing, transaction processing, concurrency and recovery control issues associated with database management systems.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC305_1	Explain concepts of database system, conceptual database design, relational algebra, SQL, normalization (K^2)
0CSPC305_2	Design ER diagram for the enterprise as well as prepare the relational database schema for the enterprise using integrity constraints, validate the design applying normalization techniques and theoretical knowledge (K^3)
0CSPC305_3	Write queries in pure languages, SQL to extract required information from the database. (K^3)
0CSPC305_4	Comprehend file organization, concepts of indexing for efficient system performance, transaction management, concurrency control and recovery of databases (K^2)

Course Contents:

Unit 1	**Introduction to databases and ER Model** **Introduction:** General introduction to database systems, its advantages and applications, Database System Architecture, Database users and Administrator, Data models, Database management system, Database languages, View of Database, Data Models. **ER Model:** Entity set, Entity types, attributes, Notations, Relationship sets, Relationship types, Keys- super key, candidate key, primary key, Extended Features of ER Model-Generalization, Specialization and aggregation	06 Hrs.
Unit 2	**Relational Model and SQL** **Relational Model:** Structure of Relational Database, Reduction of ER model into Relational schemas, Schema-instance distinction, Referential integrity and foreign keys, Relational algebra, Tuple relation calculus, Domain relational calculus, Example queries,	10 Hrs.

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	SQL: Introduction to SQL, Data definition statements with constraints, Insert, Update and Delete, Set Operations, Aggregate functions group by and having clauses, Nested Queries, Views, Complex Queries, Joins.		
Unit 3	**Functional Dependency and Normalization** Importance of a good schema design, Motivation for normal forms, Atomic domains and 1NF, Dependency theory - functional dependencies, Closure of a set of FD's, Definitions of 2NF, 3NF and BCNF, Decomposition algorithms and desirable properties of them, Multivalued dependencies and 4NF, Join dependencies and definition of 5NF, Temporal Functional Dependencies	07 Hrs.	
Unit 4	**Data Storage & Indexing** File organization, Organization of records in files, Data Dictionary, Database Buffer **Indexing:** Concept, Ordered Indices-Primary, Secondary, Multilevel, B+ Tree Index, Hashing, Hash Indices, Dynamic hashing, Multiple key access, Bitmap Indices	07 Hrs.	
Unit 5	**Transaction Management & Concurrency Control** **Transaction Processing:** Concept, ACID properties, Transaction states, Storage Structure, Implementation of atomicity, isolation and durability, Serializability, Testing of Serializability. **Concurrency Control:** Lock-based protocols, Timestamp - based Protocols, Validation -based Protocols, Multiple Granularities, Deadlock handling.	07 Hrs.	
Unit 6	**Recovery System** Failure classification, Storage structure, Implementation of stable storage, Recovery and Atomicity, Log based recovery, Checkpoints, Shadow Paging, Buffer management in crash recovery.	05 Hrs.	

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Database system concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	McGraw Hill Education	6	2011
02	Database Systems- A practical approach to Design, Implementation	Thomos Connolly, Carolyn Begg	Pearson Education.	4	2009
03	Database Systems – Design, Implementation and Management	Rob & Coronel	Thomson Course Technology	5	2008
04	Database Management Systems	Raghu Ram Krishnan	McGraw Hill	3	2002

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fundamentals of Database Systems	Ramez Elmasri and Shamkant Navathe	Pearson Education	4	2007
02	Database Systems: Design, Implementation and management	Peter Rof, Carlos Coronel	Cengage Learning	7	2014
03	Principles of Database Systems	J. D. Ullman	Galgotia publications	1	2011
04	SQL: A Complete Reference	Alexis Leon, Mathews Leon	McGraw Hill Education	1	2002

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TYCS-14154

Department of Computer Science & Engineering

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPC351- Computer Algorithms Laboratory
Prerequisite/s	0CSPC202
Teaching Scheme: Practical	2
Credits	01
Evaluation Scheme: ISE	50

Course Objectives:

01	To provide mathematical approach for analysis of algorithms.
02	To develop programming skills in a systematic way and to prepare students for advanced computer science courses.
03	To solve problems using various algorithm design strategies.
04	To choose from various design strategies for particular application.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

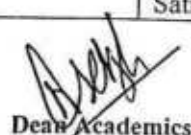| 0CSPC351_1	**Apply** different design methods of algorithm. (K^2)
0CSPC351_2	**Analyze** complexity of different algorithm designs. (K^4)
0CSPC351_3	**Communicate** effectively and work in a team for laboratory activities. (S^2)
0CSPC351_4	**Practice** rules to provide the solution for designing algorithms.(A^2)
0CSPC351_5	**Follow** professional and ethical principles during laboratory. (A^2)

Experiment List:

1	Programs based on Finding the maximum and minimum using iterative version and divide & conquer method. Compare the time complexity of both.
2	Program based on Convex Hull.
3	Program based on general method of Greedy Method.
4	Program based on Greedy Method.
5	Program based on minimum-cost spanning trees.
6	Program based on General method of Dynamic Programming.
7	Program based on Dynamic Programming.
8	Program based on general method of backtracking.
9	Program based on backtracking.
10	Program based on AND/OR graph.
11	Using OpenMP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Let Us C	Yashwant Kanetkar	BPB	3rd	2011
02	Fundamentals of Computer Algorithms	Ellis Horowitz, Satraj Sahani,	University Press	2nd	2008

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TYCS -15/54

		Saguthevar Rajasejaran			
03	Data Structures- A Pseudocode Approach with C	Richard F. Gilberg and Behrouz A. Forouzon	PWS Publishing Company	2nd	2004
04	Introduction to Algorithms	Thomas Cormen, Charles Leiserson, Ronald RIvest, Clifford Stein	Prentice Hall India	3rd	2009

Reference Books:

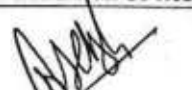| Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Design and Analysis of Algorithms	Aho, Hopfcraft and Ullman	Pearson Education	1st	2000
02	Algorithms	Kenneth Berman, Jerome Paul	CENAGE Learning	1st	2010
03	Algorithms	Robert S., Kevin W.	Pearson Education	4th	2014
04	Introduction to Design and Analysis of Algorithms	Anany Levitin	Pearson Education	1st	2008

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TYCS-16154

Course Details:

Class	B. Tech, Sem. IV
Course Code and Course Title	0CSPC352- Database Engineering Laboratory
Prerequisite/s	0CSES256
Teaching Scheme: Practical	04
Credits	02
Evaluation Scheme: ISE / ESE	50/ 50

Course Objectives: Laboratory practice aims to

01	Enable the students understand and use conceptual database design models such as ER Model to prepare database schemas.
02	Illustrate installation and configuration of relational database management systems such as Oracle / MySQL / SQL Server / PostgreSQL etc.
03	Make the students understand and implement SQL to build, manipulate database schema and to use it efficiently to retrieve data from the database.
04	Illustrate and use database indices, hashing techniques, transaction processing, and concurrency control techniques.

Course Outcomes (COs):
Upon successful completion of laboratory practice, the student will be able to:

0CSPC352_1	**Interpret** the problem statement of an enterprise, identify the need, analyse the problem and **design** ER model for the enterprise as well as prepare the relational database schema for the enterprise identifying integrity constraints for efficient design. (K^3)
0CSPC352_2	**Demonstrate** installation and configuration of Oracle /MySQL / SQL Server / PostgreSQL etc. (K^2)
0CSPC352_3	**Apply** the Structured Query language for database definition and manipulation and also use PL/SQL constructs. (S^3)
0CSPC352_4	**Experiment** with hashing techniques, transaction processing, concurrency control etc. (K^3)
0CSPC352_5	**Follow** professional and ethical principles during laboratory work in a team for laboratory activities. (A^2)

Experiment List:

1	Drawing an E-R Diagram for any organization.
2	Converting E-R diagram into Relational Tables.
3	Installation and Demonstration of DBMS Oracle / MySQL / SQL Server / PostgreSQL etc.
4	Study and Implementation of Data Definition Language (DDL) Queries (e.g. create, alter and drop tables).
5	Study and Implementation of Data Manipulation Language (DML) Queries (e.g. insert, delete, update and select statements).
6	Study and Implementation of Basic SQL SELECT statement for displaying / extracting data from single table or multiple tables.
7	Study and implementation of SQL constructs for aggregating data, use of group by, having clauses.
8	Study and implementation of nested sub-queries, complex queries, views and Joins

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9	Study and Implementation of Triggers.
10	Study and Implementation of Functions and Stored Procedures.
11	Creating Indices for the tables, implementing static hashing.
12	Implementation of Database connectivity with object oriented language (Java).
13	Few aspects of authorization such as creating and managing users, roles, granting and revoking of privileges etc.
14	Study of Transaction processing and concurrency control techniques.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Database system concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	McGraw Hill Education	6th	2011
02	Database Systems- A practical approach to Design, Implementation and Management	Thomos Connolly, Carolyn Begg	Pearson Education.	4th	2009
03	Database Systems – Design, Implementation and Management	Rob & Coronel	Thomson Course Technology	5th	2008
04	Database Management Systems	Raghu Ram Krishnan	McGraw Hill Education	3rd	2002

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fundamentals of Database Systems	Ramez Elmasri and Shamkant Navathe	Pearson Education	5th	2007
02	Database Systems: Design, Implementation and management	Peter Rof, Carlos Coronel	Cengage Learning	7th	2014
03	Principles of Database Systems	J. D. Ullaman	Galgotia publications	1st	2011
04	SQL: A Complete Reference	Alexis Leon, Mathews Leon	McGraw Hill Education	1st	2002

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TY CS - 18/54

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPE353 – Advanced Programming
Prerequisite/s	0CSES257
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	03
Evaluation Scheme: ISE/ESE	50/50

Course Objectives:

01	To develop programming skills for Python programming language
02	To develop programming skills for Ruby on Rails programming language
03	To design web applications using Python and Ruby on Rails programming language

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPE353_1	**Experiment** with Python and Ruby on Rails programming basics. (K^3)
0CSPE353_2	**Build** applications for data manipulation using Python programming language. (S^3)
0CSPE353_3	**Build** an applications using control structures in Python Programming language. (S^3)
0CSPE353_4	**Make use** of OOP concepts using Python and Ruby on Rails programming language. (K^3)
0CSPE353_5	**Examine** the observations and determine the result of experiment. (A^2)

Course Contents:

Unit 1	**Basics of Python** Features of Python, Identifiers, Reserved Keywords, Variables, Comments, Indentation in Python, Multi-line Statements, Quotes, Input-Output-import functions, Operators, Data Types and Operations	03 Hrs.
Unit 2	**Flow control, Functions and database** Decision making, Loops, control statements, Function definition, Function calling arguments, return values, Database Programming -Connecting to database , SQL queries, Files I/O	06 Hrs.
Unit 3	**Python Advanced** Classes/Objects, Regular Expressions, CGI Programming, Networking, Sending Email, Multithreading, XML Processing, GUI Programming, Further Extensions	05 Hrs
Unit 4	**Introduction of Ruby** Ruby Framework, MVC, Rails vs other technologies, Development environment, Ruby, Ruby naming convention, Interactive Ruby (IRB), variables, control structures, Loops	03 Hrs.
Unit 5	**Classes and Objects in ROR** Ruby Methods Basics, Methods Advanced: Arguments, Visibility, Constants, Arrays, Hashes, Ruby class, creating Ruby object, Ruby methods, Ruby operators, String Classes, Regular expression, Modules, Inheritance, Exception handling, simple web application using rails.	07 Hrs.

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TYCS-19|54

Unit 6	Ajax on Rail and File uploading Layout: Adding Style Sheet, How Rails Implements Ajax, AJAX Example, Creating an Application ,Creating an Ajax ,file uploading	04Hrs.

Experiments List:

1	Program based on decision making in Python
2	Program based on loops and control statements in Python
3	Program based on Strings in Python
4	Program based on List in Python
5	Program based on Tuple in Python
6	Program based on Set and Dictionary in Python
7	Program based on function in Python
8	Program to insert data in database in Python
9	Program to Update data in database in Python
10	Program to delete data from database in Python
11	Installation of Ruby and study of ruby framework
12	Implement simple ruby program sing IRB
13	Implement program on variable declaration and control structure and looping.
14	Implement program on arrays and hashes
15	Implement program on classes , objects a and methods
16	Implement program on Inheritance
17	Implement program on exception handling in ruby
18	Implement program for creating web application using rails.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introduction to computing and Problem Solving with Python	Jeeva Jose and Sojan Lal	Khanna Book Publishing Co. (P) Ltd	1	2016
02	Programming Python	Mark Lutz	O'reilly	2	2001
03	Ruby Cookbook	Lucas Carlson and Leonard Richardson	O'reilly	2	2006
04	Ruby on Rails For Dummies	Barry Burd	Wiley	Paperback	2007

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	RUBY ONRAILS TUTORIAL: Learn Web Development with Rails	Michael Hartl	Addison Wiley	4th	2016
02	Introducing Python Modern Computing in Simple Packages	LubanovicBil	O'reilly	1st	2014

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TYCS-20154

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPE354- Professional Electives- I Software Testing & Quality Assurance
Prerequisite/s	0CSPC209
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	03
Evaluation Scheme: ISE / ESE	50/50

Course Objectives:

01	To provide knowledge about fundamentals of software testing & measurement.
02	To study the fundamentals of software verification.
03	To describe the fundamentals of testing methods.
04	To study testing web applications & tools.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPE354_1	**Explain** the basic concepts of testing process & measurement.(K^2)
0CSPE354_2	**Summarize** the fundamentals software verification & creating test cases from SRS.(K^2)
0CSPE354_3	**Apply** different methods of regression testing.(K^3)
0CSPE354_4	**Build** different testing web applications & generate test data using tools. (S^3)
0CSPE354_5	**Examine** the observations and determine the result of experiment. (A^2)

Course Contents:

Unit 1	**Introduction:** Some Software Failures, Testing Process, Some Terminologies, Limitations of Testing, The V Shaped software life cycle model **Measurement- what is it and why do it?:** Measurement in everyday life, Measurement in software engineering, scope of software metrics	06 Hrs.
Unit 2	**Software Verification:** Verification Methods, SRS document verification, SDD document verification, Source code reviews, User documentation verification, Software project audit	04 Hrs.
Unit 3	**Creating test cases from SRS and Use cases:** Use Case Diagram and Use Cases, Generation of test cases from use cases, Guidelines for generating validity checks, strategies for data validity, Database testing	04 Hrs.
Unit 4	**Regression Testing:** What is regression testing?, Regression Test cases selection, Reducing the number of test cases, Risk analysis, Code coverage prioritization techniques	04 Hrs.
Unit 5	**Testing Web applications:** What is web testing?, functional testing, UI testing, Usability testing, configurations and compatibility testing, security testing, performance testing, database testing, post deployment testing, web metrics.	07 Hrs.

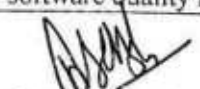HOD   Dean Academics   Director   Executive Director

TYCS-21154

Unit 6	Automated Test data generation: Automated Test Data generation, Approaches to test data generation, Test data generation tools	03 Hrs.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Software Testing	Yogesh Singh	Cambridge University Press	1	2012
02	Software Metrics – A rigorous & practical approach	Norman Fenton, Shari Lawrence Pfleeger	Thomson – Brooks	3	2014
03	Software Quality Engineering	Jeff Tian	Wiley India Ltd.	1	2006
04	Software Testing	RenuRajani, Pradeep Oak	Tata McGraw-Hill Education	1	2004

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Foundations of Software testing	Aditya P. Mathur	Pearson	2	2013
02	Software Testing	Ron Patton	Pearson (SAMS)	2	2006
03	Software Quality Assurance, Testing And Metrics	BASU, ANIRBAN	PHI Learning Pvt. Ltd.,	1	2015
04	Software Testing and Quality Assurance Theory and Practice	SagarNaik, PiyuTripathy	John Wiley & Sons, 2011	1	2011

Experiment List

1.	Write programs in C Language to demonstrate the working of the following constructs with different range of values and test cases: i) do...while ii) while....do iii) if...else iv) switch v) for
2.	A program written in C language for matrix multiplication fails "Introspect the causes for its failure and write down the possible reasons for its failure".
3.	Prepare SRS document, use case specification document and create test case matrix for use cases for any application.
4.	Demonstrate regression testing tool (e.g., Watir, Ranorex Studio)
5.	Demonstrate automated functionality testing tool (e.g. JMeter)
6.	Demonstrate web application testing tool (e.g. Selenium)
7.	Demonstrate Unit testing tool(e.g. JUnit/NUnit)
8.	Demonstrate bug tracking tool (e.g. Bugzilla)
9.	Demonstrate test management tool (e.g. Test Director/ Testuff)
10.	Demonstrate web based open source testing tool (e.g. Test Link)
11.	Demonstrate automated testing tool for desktop, web based and mobile applications. (e.g. TestComplete).
12.	Study of software quality model and estimation model.

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TY CS-22154

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPE355- Professional Elective- I Network Administration
Prerequisite/s	0CSPC203- Data Communication 0CSPC207- Computer Networks
Teaching Scheme: Lecture/Practical	2/2
Credits	03
Evaluation Scheme: ISE / ESE	50/50

Course Objectives:

01	To know basic hardware & software requirement for building a network.
02	To study network operating System & Concept of various network services.
03	To install and maintain a windows/Linux server,
04	To learn the Linux server operating system.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPE355_1	Explain various concepts related to network administration and maintaining its security. (K^2)
0CSPE355_2	Apply active Directory Services, Configure & troubleshoot services in a windows server. (K^3)
0CSPE355_3	Make use of Linux Operating System to install, configure, and troubleshoot it's services. (K^3)
0CSPE355_4	Demonstrate programs in an effective way related to network operating systems. (S^3)
0CSPE355_5	Communicate effectively in both oral and written form during laboratory sessions. (A^2)

Course Contents:

Unit 1	**Concepts Of Networking** Network configuration- Peer-to-Peer Network, Server based Network Network Topologies & Types. Basic Network Media. **Planning & Installing Network Hardware** Types of Server- File, Print, Mail, Web & Database Servers. Installing a NIC, Twisted Pair Cable, Fiber optic Cable, Switches etc.	06 Hrs.
Unit 2	**Windows Server** **Installing & Configuring Windows Server :** Checking System Requirements., Choosing a File System., Planning Partitions, and Deciding TCP/IP Configuration, Choosing Workgroups or domains. **Dealing with Directory Services:** Define directory services, (NDS), Windows NT Domains, Microsoft Active Directory Service (ADS), X.500 Directory Access Protocol (DAP), and LDAP.	04 Hrs.
Unit 3	**Linux:** Introduction to Linux, History of Linux, Basic Concepts of Operating Systems, Kernel, shell and file system structure. Basic Concepts of Linux, Basic Commands of Linux, Advanced Linux Commands.	04 Hrs.

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TYCS-23154

Unit 4	**Configuring DHCP And DNS** **Dynamic Host Configuration Protocol (DHCP)** Configuring Linux as DHCP server. Configuring various clients for DHCP server (Windows & Linux) **DNS (Domain Name System) –** Understanding DNS Names- Domain, domain-naming, top level domains, sub-domains, Name Resolution. Managing DNS server and DNS Clients. (Windows & Linux)	04 Hrs.
Unit 5	**Linux Services : -** Introduction, Boot and system configuration services, Network Tools, SE linux policy rules and configuration files, Linux services and protocols – FTP, SMTP, Telnet, IP Sec. and VPN (Virtual Private Network), managing services, Super user control, system run levels, performance analysis tools, GRUB and RAID.	04 Hrs.
Unit 6	**Linux Security** Securing your Linux Server, Implementing local security, Implementing network security, Implementing data security, Basic elements of Fire Wall using IP Tables.	06 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Windows Internals, Including Windows Server 2012 R2 and Windows Vista	Mark E. Russinovich and David A. Solomon	MS Press	5	2009
02	Introducing Server 2012 R2	Charlie Russel and Craig Zacker	Microsoft Press	5	2011
03	A Practical Guide to Linux Commands, Editors, and Shell Programming	Mark G. Sobell	Pearson	2	2010
04	Linux: The Complete Reference	Richard Petersen	TMGH	6	2004

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Complete Reference Networking	Craig Zacker	Tata McGraw Hill	1	2011
02	Linux Command Line and Shell Scripting Bible	Richard Blum, Christine Bresnahan	Wiley India	6	2008
03	Mastering Windows Server 2012 R2	Mark Minasi	Wiley India	1	2014
04	Red Hat RHCSA/RHCE 7 Cert Guide: Red Hat Enterprise Linux 7 (EX200 and EX300)	Sander van Vugt	Pearson	1	2015

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TYCS-24154

Unit 4	**Configuring DHCP And DNS** **Dynamic Host Configuration Protocol (DHCP)** Configuring Linux as DHCP server. Configuring various clients for DHCP server (Windows & Linux) **DNS (Domain Name System) –** Understanding DNS Names- Domain, domain-naming, top level domains, sub-domains, Name Resolution. Managing DNS server and DNS Clients. (Windows & Linux)	04 Hrs.
Unit 5	**Linux Services : -** Introduction, Boot and system configuration services, Network Tools, SE linux policy rules and configuration files, Linux services and protocols – FTP, SMTP, Telnet, IP Sec. and VPN (Virtual Private Network), managing services, Super user control, system run levels, performance analysis tools, GRUB and RAID.	04 Hrs.
Unit 6	**Linux Security** Securing your Linux Server, Implementing local security, Implementing network security, Implementing data security, Basic elements of Fire Wall using IP Tables.	06 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Windows Internals, Including Windows Server 2012 R2 and Windows Vista	Mark E. Russinovich and David A. Solomon	MS Press	5	2009
02	Introducing Server 2012 R2	Charlie Russel and Craig Zacker	Microsoft Press	5	2011
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04	Red Hat RHCSA/RHCE 7 Cert Guide: Red Hat Enterprise Linux 7 (EX200 and EX300)	Sander van Vugt	Pearson	1	2015

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Experiments List:

1	Understand the networking in the laboratory and determination of various networking hardware and software components with their technical specification.
2	Install and Configure Network Interface card and configure TCP/IP in the laboratory.
3	Installing and Configuring Windows server
4	Installing and Configuring Linux server
5	Set up Domain Name System (DNS) Server and Install Active Directory Server on windows server/Linux.
6	Creating and Managing user accounts in windows server/Linux
7	Create, delete, and modify local groups and group memberships
8	Installing Active Directory & Creating AD Objects
9	Install and configure DHCP Server
10	Configure following services on Linux server: i) Managing User accounts and device configuration ii) Configure and use Telnet and VNC iii) Windows connectivity through Samba Server iv) Configure web server and FTP server v) Configure proxy server
11	Create Domain Controller, new Users & assign privileges/ Permission/ Modify/ Delete/Deactivate Users and groups
12	Configure firewall settings using firewall-config, firewall-cmd, or iptables
13	Configure key-based authentication for SSH
14	List and identify SELinux file and process context

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TYCS -25|54

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSPR356- Theme Based Mini Project
Prerequisite/s	-
Teaching Scheme: Practical	2
Credits	1
Evaluation Scheme: ISE /ESE	50/50

Course Objectives:

01	To design, develop and implement a group project.
02	To expose the students to use the engineering approach to solve the real time problems.
03	To learn the skills of team building & team work
04	To use the appropriate and newer technologies while developing the project

Course Outcomes: Students should be able to

0CSPR356_1	Identify specific problem statement from a selected domain and prepare SRS documents.(K³)
0CSPR356_2	Design and construct a software system, component, or process to meet desired needs.(K³)
0CSPR356_3	Develop the software product using programming language. (S³)
0CSPR356_4	Improve writing skills to compose project report professionally. (S³)
0CSPR356_5	Follow given instructions during practical performance. (A²)

Course Contents:

Platforms: Free and Open source software.

1	Three students (Maximum) in a group shall carry out a mini project. A batch of practical / shall be divided into mini project groups.
2	Mini project topics and the work for these groups in the batch shall be guided by a teacher for the batch, preferably on one of the topics which is selected by the students in his/her domain.
3	Alternatively, a group may select another topic of relevance in consultation with senior students and teachers.
4	A group shall undertake IBM TGMC (The Great Mind Challenge) projects, past Smart India Hackathon, KPIT Sparkle topic Or the topic related to the courses the students have studied/studying.
5	The teacher shall periodically assess the performance of individual student in the mini project, jointly with a teacher of another batch. This assessment will be used for determining ISE marks of the mini project.
6	Project group shall submit hardcopy of project report along with related code and documentation in soft form at the end of the semester..

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TYCB1-26154

Course Details:

Class	B. Tech, Sem. V
Course Code and Course Title	0CSAC314- Entrepreneurship Development and Planning
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial	2/0
Credits	00
Evaluation Scheme: ISE	Grade

Course Objectives:

01	Develop and strengthen the entrepreneurship quality
02	Formulate the proposal for the product
03	Know the sources of help and support available for stating a small scale industry
04	Develop a broad vision about the business

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSAC314_1	Explain the nature and function of entrepreneurship (K²)
0CSAC314_2	Explain what characterizes an attractive business opportunities and common pitfalls during the entrepreneurial process (K²)
0CSAC314_3	Identify Finance and marketing solutions for Business (K³)
0CSAC314_4	Explain Concept and Characteristics of Small Scale Industry (K²)
0CSAC314_5	Develop Business plan (K⁶)

Course Contents:

Unit 1	**Entrepreneur and Entrepreneurship** The Entrepreneur : Definition and Concept, Entrepreneurial Traits, Characteristics and skills, Classification of entrepreneurship, Entrepreneur vs Professional Manager, Women Entrepreneurs, Nature and Importance of entrepreneurs, Concept of entrepreneurship, Theories of entrepreneurship	05 Hrs.
Unit 2	**Identification of Business Opportunities** Introduction, An Illustration: choice of product, Project ideas, Scanning of Business Environment and Identifying business idea, Concept of Project, Importance of Project Identification, Project Profile	04 Hrs.
Unit 3	**Sources of Finance** Sources of Finance, Project Financing, Institutional Finance to Entrepreneurs, Financial Intuitions, Role of consultancy organization	05 Hrs.
Unit 4	**Marketing** Methods of Marketing, Marketing Channels, Marketing Institutions and Assistance, E-Commerce, Exploring Export Possibilities.	05 Hrs.

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TYCS-27154

Unit 5	**Concept and Characteristics of Small Scale Industry** Introduction, SSI Units, Characteristics of SSI, Importance of Small Enterprise, Advantages of Small-scale Enterprises, Challenges and Opportunities	04 Hrs.
Unit 6	**Business Plan Development** Creativity and Business idea, Legal issues for entrepreneur, Creating business plan, Feasibility analysis, Technical or Operational analysis, Production/Operation plan, Organizational Plan, Project report preparation and Evaluation, Starting the venture	05 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Dynamics of Entrepreneurial Development and Management	Vasant Desai	Himalaya Publishing House	6th	2018
02	Small-Scale Industries and Entrepreneurship – In the twenty-first century	Vasant Desai	Himalaya Publishing House	9th	2011

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Entrepreneurship	Dean Shepherd, Michael Peters	Tata McGraw Hill Edition Pvt Ltd	6th	2008
02	Entrepreneurship : Successfully Launching New Ventures	Barringer and Ireland	Pearson	3rd	2006
03	All In Startup : Launching a new Idea when Everything Is on the Line	Diana Kander	Wiley	3rd	2014
04	Disciplined Entrepreneurship : 24 Steps to a Successful Startup	Bill Aulet	Wily	3rd	2013

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TYCS-28/54

Teaching and Evaluation Scheme
B. Tech Semester VI

Course Code	Course	Teaching Scheme				Evaluation Scheme				
							Theory Marks		Practical Marks	
		L	T	P	Credits	Scheme	Max.	Min. for Passing	Max.	Min. for Passing
0CSPC306	Advanced Database System	3	0	0	3	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC307	Machine Learning	3	1	0	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPE3**	Professional Elective- II	3	1	0	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPE3**	Professional Elective- III	3	1	0	4	ISE I	10	40	--	--
						MSE	30		--	--
						ISE II	10		--	--
						ESE	50		--	--
0CSPC357	Unix & Shell Programming Laboratory	0	0	2	1	ISE I			50	20
0CSPC358	Object Oriented Modeling and Design	2	0	2	3	ISE			50	20
						ESE	POE		50	20
0CSPC359	Advanced Database System Laboratory	0	0	2	1	ISE			50	20
						ESE	POE		50	20
0CSPC360	Web Programming	2	0	4	4	ISE			50	20
						ESE	POE		50	20
0CSAC315	Soft Skills	0	1	0	-	Grade				
Total		16	4	10	24		400		350	
Total Contact Hours/Week: 30 hrs										

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TYCS-29154

Professional Electives- II	Professional Electives- III
1. Digital Image Processing - 08 2. Ad hoc Networks. - 09 3. Advanced Data Structures -10	1. Computer Graphics & Multimedia Techniques - 11 2. Storage Network - 12 3. Cyber Security - 13

Course Category	HS	BS	ES	PC	PE	OE	PR
Credits	-	-	-	16	8	-	-
Cumulative Sum	3	28	37	61	11	-	2

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TYCS-30154

Course Details:

Class	B. Tech, Sem. VI
Course Code and Course Title	0CSPC306- Advanced Database Systems
Prerequisite/s	0CSPC305- Database Engineering
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

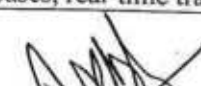| 01	To identify the knowledge of object based databases which allows supporting complex data types, collection types and inheritance.
02	To illustrate the concepts involved in the Distributed and Parallel database systems.
03	To learn different transaction processing and security issues.
04	To Know the basic concept of data warehousing, NoSQL and OLAP queries.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC306_1	Describe modeling and development methods/techniques in Object-Relational Databases.(K^2)
0CSPC306_2	Explain knowledge on the need, issues, design and application of both parallel and Distributed databases.(K^2)
0CSPC306_3	Describe different issues in application development and advanced transaction processing.(K^2)
0CSPC306_4	Apply different database security, PL/SQL, NoSQL and OLAP queries on various databases. (K^3)
0CSPC306_5	Compare and illustrate methods/technologies in developing data warehouses (K^2)

Course Contents:

Unit 1	**Object and Object Relational Databases** Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Persistent Programming Languages, Object-Relational Mapping, Object-Oriented versus Object-Relational.	07 Hrs.
Unit 2	**Parallel and Distributed Databases** Database System Architectures: Centralized and Client-Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Network Types, Parallel Databases: I/O Parallelism, Inter and Intra Query Parallelism, Inter and Intra operation Parallelism, Design of Parallel Systems, Distributed Database Concepts - Distributed Data Storage, Commit Protocols, Concurrency Control, Distributed Query Processing	08 Hrs.
Unit 3	**Advanced Transaction Processing** Transaction-processing monitors, transactional workflows, E-commerce, main-memory databases, real-time transaction systems, long-duration transactions.	05 Hrs.

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Unit 4	Database Security and Advanced SQL	08 Hrs.
	Discretionary Access Control, Mandatory Access Control, Audit Trails in Databases, Statistical Databases , PL SQL- A Basic introduction, Functions and Procedure, Packages, Synonyms, Database Links, Embedded SQL and Dynamic SQL.	
Unit 5	NoSQL	07 Hrs.
	The NoSQL – Introduction, Difference between SQL and NoSQL, List of NoSQL Databases, Characteristics of NoSQL MongoDB - Advantages, Installation, Data Model of MongoDB, Creating database, Drop Database, Create collection, Drop collection - Data types, Insert document, Update document, Query document, Delete document, Sorting records, Indexing, Aggregation	
Unit 6	Data Warehouse and OLAP	07 Hrs.
	Data Warehousing, Creating and maintaining a warehouse. OLAP: Multidimensional data Model, Star Schemas, OLAP Queries, Database design for OLAP, Implementation Techniques for OLAP Bitmap Indexes, Join Indexes, Views and decision support, Top N Queries, Online Aggregation.	

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Database system concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	Mc Graw Hill Education	6	2011
02	Database Systems- A practical approach to Design, Implementation	Thomos Connolly, Carolyn Begg	Pearson Education.	4	2009
03	Getting Started with NoSQL	Gaurav Vaish	Packet	2	2012
04	Database Management Systems	Raghu Ram Krishnan	McGraw Hill	3	2002

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fundamentals of Database Systems	RamezElmasri and ShamkantNavathe	Pearson Education	4	2007
02	Database Systems: Design, Implementation and management	PeterRof, Carlos Coronel	Cengage Learning	7	2014
03	Principals of Database Systems	J. D. Ullman	Galgotia publications	1	2011
04	Sql: A Complete Reference	Alexis Leon	McGraw Hill Education	1	2002

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TYCS-32|54

Course Details:

Class	B. Tech, Sem. VI
Course Code and Course Title	0CSPE307 Machine Learning
Prerequisite/s	0CSBS112, 0CSBS103
Teaching Scheme: Lecture/Tutorial	3/1
Credits	04
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

1	To introduce some of the basic concepts of machine learning from a mathematically well motivated perspective
2	To make the students understand and use various machine learning algorithms

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPE307_1	**Explain** fundamental issues, challenges and algorithms of machine learning (K^2)
0CSPE307_2	**Demonstrate** and **use** various algorithms and models with mathematical justifications (K^3)
0CSPE307_3	**Comprehend** strengths and weaknesses of various machine learning approaches and use appropriate machine learning algorithms for real-world applications. (K^4)

Course Contents:

Unit 1	**Introduction** Introduction to Machine Learning, Applications, History of machine learning, Types of Learning, Hypothesis space, inductive bias, evaluation and cross-validation	6 Hrs.
Unit 2	**Regression and Decision Trees** Linear and Multivariate Regression, Logistic Regression, Regularization, Decision Tree representation, algorithms, issues	8 Hrs.
Unit 3	**Instance Based Learning and Feature Selection** k-nearest neighbor, Case-based reasoning, feature selection, feature extraction, collaborative filtering	7 Hrs.
Unit 4	**Probability and Bayes Learning** Bayes Theorem, Bayesian Learning, Naïve Bayes Classifier, Bayesian Network	7 Hrs.
Unit 5	**Support Vector Machines and Neural Network** Introduction to support Vector Machine, The dual formulation, maximum margin with noise, non-linear SVM and kernel function, Solution to the dual problem Introduction to neural network, multilayer neural network, backpropagation, introduction to deep neural network	8 Hrs.
Unit 6	**Clustering and Ensemble Learning** Introduction to clustering, k-means clustering, Hierarchical Clustering Introduction to ensemble learning, Bagging and boosting	6 Hrs.

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TTCS-33|54

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Machine Learning	Tom Mitchell	McGraw-Hill	1st	1997
02	Introduction to Machine Learning	Ethem Alpaydin	The MIT Press	2nd	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Elements of Statistical Learning	T. Hastie, R. Tibshirani, J. Friedman		2nd	2008
02	NPTEL course Introduction to Machine Learning	Prof. Sudeshna Sarkar	NPTEL	-	-

HOD

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TYCS-34154

Course Details:

Class	B. Tech, Sem. VI
Course Code and Course Title	0CSPE308- Professional Elective- II Digital Image Processing
Prerequisite/s	0CSBS103
Teaching Scheme: Lecture/Tutorial	3/1
Credits	04
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

1	To provide knowledge about fundamentals of digital image processing.
2	To make the students understand the concepts of image transforms, image enhancement, restoration, image segmentation, morphological operations, compression etc.
3	To acquaint students with the knowledge of digital image processing so as to enable them to apply it in solving real world problems
4	To build the skills necessary to further explore advanced topics of Digital Image Processing.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPE308_1	**Explain** fundamental concepts of digital image processing, mathematical transforms, image enhancement, restoration, segmentation, morphology, compression.(K^2)
0CSPE308_2	**Write** algorithms and **apply** the concepts mathematically to **interpret** the results with justification.(K^3)
0CSPE308_3	**Compare** different algorithms of image processing and apply them to solve real life problems. (K^4)

Course Contents:

Unit 1	**Digital Image Fundamentals** Introduction: Concept, Fundamental Steps and Components of Image Processing System *Digital Image Fundamentals*: Image Acquisition, A simple image model, Sampling and Quantization, Imaging Geometry, Different types of digital images	6 Hrs
Unit 2	**Image Transforms** 2D systems and Necessary Mathematical preliminaries, 2D Orthogonal and Unitary Transforms, DFT, KL-Transforms, Cosine Transform, Hadamard Transforms, Introduction to Wavelet transform	6 Hrs
Unit 3	**Image Enhancement and Restoration** Image Enhancement: Point Processing, Basic Gray Level Transformations, Histogram Processing, Spatial domain Filtering, Frequency domain filtering Image Restoration: Model of image degradation/restoration process, Noise models, Restoration – spatial filtering	10 Hrs
Unit 4	**Image Segmentation and Analysis** Point, Line and Edge Detection, Edge Detection – using first and second order derivatives, LoG, Canny edge detector, Thresholding, Boundary Extraction –	9 Hrs

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TYCS-35154

Department of Computer Science & Engineering

Course Details:

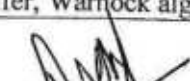| Class	B.Tech-Sem-VI
Course Code and Course Title	0CSPE311- Professional Elective- II Computer Graphics & Multimedia Techniques
Designated as	Compulsory
Prerequisite/s	0BSES112
Teaching Scheme (Lecture/ Tutorial)	03/01
Total Contact Hours: Theory//Tutorial	42/14/00/00 Hours
Credits	04
Evaluation Scheme: ISE-I/MSE/ISE-II/ESE	10/30/10/50

Course Educational Objectives(CEOs)

1	To Know OpenGL architecture and its use.
2	To understand fundamental graphics primitives,2-D and 3-D transformation
3	To familiar with different algorithms.
4	To understand different curve techniques and its application

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

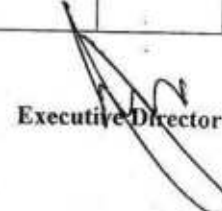| 0CSPE311_1	Understand the graphics primitives and 2D & 3D transformation.(K^2)
0CSPE311_2	Apply different graphics algorithms. (K^3)
0CSPE311_3	Discuss various generations of curves. (K^2)
0CSPE311_4	Compare various Computer Animation Technique. (K^2)
0CSPE311_5	Demonstrate programs for various graphics algorithm. (A^3)
0CSPE311_6	Accurately use Opengl software for graphics program.(S^3)

Course Syllabus

Unit 1	Introduction: Introduction of Opengl, Glut, Function of OpenGl, Glut,Glut Library	03 Hrs.
Unit 2	Transformations Basic 2D & 3D transformations: Translation, Rotation, Scaling, Reflection, Multiple Transformations, Homogenous Coordinate, Rotation about an axis parallel to a coordinate axis, rotation about an arbitrary axis in space, Projection and its types	10 Hrs.
Unit 3	Raster Scan Graphics DDA Line drawing Algorithm, Bresenham's line and circle drawing algorithms, Frame Buffer, Anti-aliasing, Scan converting polygons: Edge fill and Seed fill algorithms.	08 Hrs.
Unit 4	Viewing and clipping: Introduction, Windowing and View-porting, Introduction to clipping, Point clipping, and line clipping: Sutherland - Cohen line clipping algorithm, polygon clipping algorithm	05 Hrs.
Unit 5	Curves and Surfaces : Curve Representation, Non-parametric and parametric curves, representation of space curves, Cubic Spline, Parabolic Blending, Bezier curves and B-spline curves, Z- buffer, Warnock algorithm..	09 Hrs.

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TYCS-36154

Unit 6	**Computer Animation:** Introduction, Key frame animation, Construction of an animation sequence, Motion control methods, Procedural animation, Key-frame animation vs. Procedural animation, Introduction to Morphing, Warping techniques, Multimedia Technique.	07 Hrs.

Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Computer Graphics Theory and Practice Using OpenGL-(For Units 1)	Maya, Shalini Govil-Pai	Springer	Personal Learning *Edition*	2009
2	Mathematical elements for Computer Graphics-(For Units 2)	David F. Rogers, J. Alan Adams	MGH Int.	Second	2002
3	Procedural elements for Computer Graphics-(For Units 3,4)	David F. Rogers	MGH Int.	Second	2008
4	Computer Graphics-(For Unit 5,6)	Rajesh Maurya	WILEY India	-	-

Reference Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Interactive Computer Graphics	Newman Sproul	MGH	Second	1995
2	Computer Graphics	Zhigang Xiang & Roy Plastock (Schaum's	Outline Series, TMGH).	second Edition	2009
3	Computer Graphics Using OpenGL	F.S. Hill Jr. Stephen M. Kelley,	Pearson Education	-	-
4	Computer Graphics C	Donald D. Hearn, M. Pauline Baker	(Pearson)	Second	-

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TYCS-37/54

Course Details:

Class	B. Tech, Sem. VI
Course Code and Course Title	0CSPE312- Professional Elective- III Storage Network
Prerequisite/s	0CSPC207,0CSPC208
Teaching Scheme: Lecture/Tutorial	03/01
Credits	04
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:	
01	To Study storage system architectures and business needs of storage management.
02	To Understand Storage Area Networks characteristics, components, Fibre Channel protocols and how SAN components use them to communicate with each other.
03	To learn storage virtualization, Business continuity, backup & recovery techniques.
04	To Study RAID systems and storage security mechanisms.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

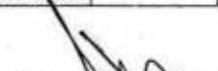| 0CSPE312_1	Explain different storage system and its components. (K^2)
0CSPE312_2	Use different techniques to evaluate performance of storage system.(K^3)
0CSPE312_3	Describe different storage network technologies and virtualization. (K^2)
0CSPE312_4	Illustrate business continuity, backup & recovery process of storage network. (K^2)
0CSPE312_5	Explain replication and storage security mechanisms. (K^2)

Course Contents:

Unit 1	**Introduction to information storage and Storage System Environment** Evolution of storage technology and architecture, Data Center Infrastructure, Key Challenges in Managing Information, Information Lifecycle, Components of Storage, System Environment, Disk Drive Components, Disk Drive Performance, Laws governing disk Performance, Logical Components of Host, Application requirements and disk Performance.	07 Hrs
Unit 2	**Intelligent Storage System** Components of Intelligent Storage System, Intelligent Storage Array. Direct attached Storage – types, benefits and limitation, Disk drive Interface, Introduction to parallel SCSI, SCSI command model.RAID - Implementation of RAID, RAID array components, RAID levels, Hot Spares	05 Hrs
Unit 3	**Storage Area Network and Network Attached Storage** SAN – Evolution, Components of SAN, Fibre Channel Protocol Stack Links, ports and topologies, Fibre Channel SAN – point-to- point topology, Fabric topology, Arbitrated loop topology. NAS - Local File Systems, Network File System and File	09 Hrs

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TY CS-38154

	Servers, Benefits of NAS, NAS file I/O, Components of NAS, NAS Implementations, NAS File sharing Protocols, NAS I/O operations, Factors affecting NAS Performance.	
Unit 4	**Storage Virtualization** Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block and file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.	06 Hrs
Unit 5	**Business Continuity, Backup and Recovery** Introduction, Information Availability, Cause of Information unavailability, Measuring information Availability, Consequences of down time, BC terminology, BC planning life cycle, Failure Analysis, BC Technology Solutions, Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Process, Backup and Restore Operations, Backup Topology, Backup in NAS environment, Backup Technologies	09 Hrs
Unit 6	**Replication and Storage Security** Local Replication, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations. Storage Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking	06 Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Information Storage and Management	G. Somasudaram	EMC Education Services (Wiley India Edition)	1	2010
2	Storage Networks Explained	Ulf Troppen, Rainer Erkens, Wolfgang Müller	(Wiley India Edition)	1	2008
3	Storage Networks-The Complete Reference	Robert Spalding	Tata McGraw Hill	. 1	2003
4	Storage Network Management and Retrieval	Vaishali D. Khairnar, Nilima M. Dongre	Wiley	1	2016

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TYCS-39154

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Storage Networking Fundamentals: An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems (Vol 1)	Marc Farley	Cisco Press	1	2005
2	Information Storage and Retrieval	R. Korfhage	Wiley	1	1997
3	Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs	Richard Barker and Paul Massiglia	Wiley	1	2001
4	Using SANs and NAS	W. Curtis Preston,	O'Reilly	1	2002

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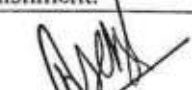TYCS-40/54

Course Details:

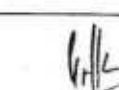| Class	B. Tech, Sem. VI
Course Code and Course Title	0CSPE313 Professional Elective- III Cyber Security
Prerequisite/s	0CSPC304 - Information & Network Security
Teaching Scheme: Lecture/Tutorial	3/1
Credits	04
Evaluation Scheme: ISE I / MSE/ISE II/ESE	10/30/10/50

Course Objectives:

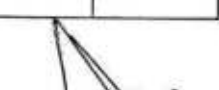|	
01	To learn what cybercrime is and get an overview of cybercrime scenario in India as well as the overall global perspective.
02	To learn how attackers plan cyber offences against an individual and/or against an organization.
03	To learn forensics and investigation techniques.
04	To get an overview of Ethical Hacking

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPE313_1	**Explain** the concepts of cyber security. (K^2)
0CSPE313_2	**Apply** methods for cyber security methods with intrusion detection and prevention. (K^3)
0CSPE313_3	**Identify** different cybercrimes and respective penalties in IT Act. (K^3)
0CSPE313_4	**Apply** the scientific method to cyber forensics and ethical Hacking.(K^3)
0CSPE313_5	**Communicate** effectively in both oral and written form during tutorial sessions.(A^2)

Course Contents:

Unit 1	**Introduction to Cyber Security.** Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.	07 Hrs.
Unit 2	**Cyber Security Vulnerabilities and Cyber Security Safeguards** Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.	07 Hrs.
Unit 3	**Cybercrimes and Cyber Security :The legal perspectives** Intellectual Property in the Cyber space, Cyber Crime and the legal and scape around the world, Need of Cyber laws: The Indian context, The Indian IT Act, Digital signature and the Indian IT Act, Amendments to the Indian IT Act, Cyber-crime and punishment.	07Hrs.

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TYCS-41/54

Unit 4	**Securing Web Application, Services and Servers** Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.	07Hrs.
Unit 5	**Cyber Forensics** Introduction to Cyber Forensics, Handling Preliminary Investigations, Controlling an Investigation, Conducting disk-based analysis, Investigating Information-hiding, Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time.	07Hrs.
Unit 6	**Ethical Hacking** Introduction, Hack classification, Foot Printing, Google Hacking, Scanning, Windows Hacking, Linux Hacking, Email hacking, Proxy & Packet Filtering, Sniffer, Incident handling and response.	07Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	"Cyber Security"	Nina Godbole & Sunit Belapure,	Wiley India	1	2011
02	Cyber Space and Cyber Security	George K. Kostopoulous	CRC Press	1	2013
03	Computer Forensics and Investigations	Nelson Phillips and Enfinger Steuart	Cengage Learning, New Delhi,	1	2009
04	Hacking Exposed Web Application	Joel Scambray, Vincent Liu, Caleb Sima	McGraw-Hill Education	3	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	"Cyber Security Essentials	James Graham, Richard Howard, Ryan Olson, CRC Press, Taylor	An Auerbach Book	1	2010
02	"Computer Forensics and Cyber Crime"	Marjie T. Britz,	Pearson	3	2013
03	Cyber Law Simplified	Vivek Sood	TMH	1	2002
04	Cryptography and Security	CK Shyamala et el.,	Wiley India Pvt. Ltd	4	2018

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TYCS-42454

Course Details:

Class	B. Tech, Sem. VI
Course Code and Course Title	0CSPC357 - **Unix and Shell Programming Laboratory**
Prerequisite/s	0CSPC254
Teaching Scheme: Practical	02
Credits	01
Evaluation Scheme: ISE	50

Course Objectives:

01	To provide introduction to UNIX Operating System and its File System
02	To gain an understanding of important aspects related to the SHELL and the process
03	To develop the ability to formulate regular expressions and use them for pattern matching.
04	To provide a comprehensive introduction to SHELL programming, services and utilities

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPC357_1	**Describe** the architecture and features of UNIX Operating System and distinguish it from other Operating System.(K^2)
0CSPC357_2	**Demonstrate** UNIX commands for file handling and process control.(K^3)
0CSPC357_3	**Write** Regular expressions for pattern matching and apply them to Various filters for a specific task.(K^3)
0CSPC357_4	**Analyze** a given problem and apply requisite facets of SHELL Programming in order to devise a SHELL script to solve the problem.(K^4)
0CSPC357_5	**Perform** different UNIX commands and SHELL Programming to solve problem. (S^2)
0CSPC357_6	**Follow** professional and ethical principles during laboratory work in a team for laboratory activities. (A^2)

Course Contents: It should consist of minimum 8-10 experiments based on following list.

1.	Introduction to Unix operating system- Basic Commands and Processing Environment a. fork, vfork, wait, wait pid(),exec (all variations exec), and exit
2.	IPC: Interrupts and Signals: signal(any fives type of signal), alarm, kill, signal, sigaction, pause
3.	File system Internals a. Stat, fstat, ustat
4.	File system Internals b. Threading concept: clone, threads of java.
5.	Study of vi editor. - The vi editor. Basics. The .exrc file. Different ways of invoking and quitting vi. Different modes of vi. Input mode commands. Command mode commands.
6.	Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
7.	a) Write a shell script program to display list of user currently logged in. b) Write a shell script program to display "HELLO WORLD". c) Write a shell script program to develop a scientific calculator. d) Write a shell Script program to check whether the given number is even or odd. e) Shell script Program to search whether element is present is in the list or not.
8.	a) Shell script program to check whether given file is a directory or not.

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TYCS-43/54

		b) Shell script program to count number of files in a Directory. c) Shell script program to copy contents of one file to another. d) Create directory, write contents on that and Copy to a suitable location in your home directory. e) Use a pipeline and command substitution to set the length of a line in file to a variable. Write a program using sed command to print duplicated lines of Input.
9.		Write a grep/egrep script to find the number of words character, words and lines in a file. Write an awk script to develop a Fibonacci series.
10.		a) Write a shell script program to display the process attributes. b) Write a shell script to change the priority of processes. c) Write a shell script to change the ownership of processes. d) Write a program to send back a process from foreground. e) Write a program to retrieve a process from background. f) Write a program to create a Zombie process. g) Write a program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen
11.		a) Write a shell script program to check variable attributes of file and processes. b) Write a shell script program to check and list attributes of processes. c) Shell Script program to implement read, write, and execute permissions. d) Shell Script program for changing process priority.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Design of Unix Operating System	Maurice J. Bach	Pearson	1st	2015
02	Introduction to Unix and shell Programming	Venkateshmurthy	Pearson	3rd	2005
03	Shell Programming in Unix, Linux and OS X	Stephen G. Kochan, Patrick Wood	Addison-Wesley	4th	2016
04	Unix and Shell Programming	YashwantKanetkar	BPB	1st	2003

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Unix Concepts and Applications	Sumitabha Das	TMGH	3rd	2005
02	Unix Network Programming	W. Richard Stevens	PHI	2nd	1990
03	UNIX and Shell Programming	Behrouz A. Forouzan ,Richard F. Gilberg	THOMSON	1st	2003
04	Learning Linux Shell Scripting	Ganesh SanjivNaik	Packt	2nd	2018

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T4CS-44/54

Course Details:

Class	B. Tech Sem -VI
Course Code & Course Title	0CSPC358- Object Oriented Modeling and Design
Prerequisite/s	0CSPC209
Teaching Scheme (Lecture/Tutorial/Practical)	02/00/02
Credits	03
Evaluation Scheme: ISE/ESE	50/50

Course Objectives	
1	To provide depth understanding of object oriented approaches.
2	To introduce various modeling techniques for design of Object Oriented Models.
3	To describe Unified Modeling Language (UML) and its role in software development life cycle.
4	To design model using UML class notations and use-cases based notations.

Course Outcomes (COs) Students will be able to:	
0CSPC358_1	Describe fundamental concept of Object oriented modelling and design. (K^2)
0CSPC358_2	Explain novel way of thinking abstractly about a problem using real world concepts rather than computer concepts. (K^2)
0CSPC358_3	Describe object oriented modeling techniques methodology that combines three views of modeling systems. (K^2)
0CSPC358_4	Identify with diagram conceptual, behavioral and architectural modeling of the UML. (K^3)
0CSPC358_5	Compare structural and behavioral diagram using UML. (K^4)
0CSPC358_6	Prepare and present a power point presentation on assigned topic(S^3)
0CSPC358_7	Follow professional and ethical principles during laboratory work in a team for laboratory activities. (A^2)

Course Contents:		
Unit 1	**Introduction** Modeling as a design technique, Objects, classes, links and associations, generalization and Inheritance, Aggregation, abstract classes, generalization as extension and restriction, and multiple inheritance.	04 Hrs
Unit 2	**Dynamic & Functional Modeling** Events and states, operations, nested state diagrams, concurrency, advanced dynamic modeling concepts, relation of object and dynamic models, Data Flow Diagrams, relation of functional to object and dynamic models.	05 Hrs
Unit 3	**Design Methodology** Analysis Overview, System design with examples, Object Design, combining the three models, designing Algorithms, design Optimization, implementation of Controls, design association.	05 Hrs

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TYCS-45/54

Unit 4	**Structural Modeling using UML**	05 Hrs
	Classes, Relationships, Common mechanisms, Diagrams, Class Diagrams, Interfaces, Types and Roles, Packages, Instances and Object Diagram	
Unit 5	**Behavioral Modeling using UML** Interactions, Use cases, Use case diagram, Interaction Diagrams and Activity diagrams, Events and signals, State Machines, State chart diagrams	05 Hrs
Unit 6	**Architectural Modeling** Components, Deployment, Collaboration, Component Diagrams, Deployment Diagrams	04 Hrs

List of Experiments: It should consist of minimum 8-10 experiments based on following list.

1.	Learning Setup and configuration of RSA/Rational Rose.
2.	Study of class and instance diagrams in OMT Methodology.
3.	Study of different relationships between classes in the object model.
4.	Study of issues related to Functional and dynamic model in OMT Methodology.
5.	Draw Use Case diagram for particular scenario.
6.	Draw sequence diagram.
7.	Draw class diagram.
8.	Draw collaboration diagram.
9.	Working with packages.
10.	Adding attributes & operations to classes & relationship. (Types, association, dependencies, aggregation, Generalization, multiplicity)
11.	Draw state transition diagram and Activity diagrams.
12.	Setting Component view.
13.	Setting Deployment View.
14	Code generation and validations.

Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Object-orientated Modeling & Design	James Rumbaugh, Michael Blaha, William Premerlani, Frederick Eddy, William Lorensen	Prentice-Hall of India(PHI)	2	2005
2.	The Unified Modeling Language User Guide	Grady Booch, James Rumbaugh, Lvar Jacobson.	Pearson	2	2008
3.	Object Oriented Modeling and Design with UML2.0	James Rumbaugh, Michael Blaha	Pearson	2	2001
4.	Software Modeling & Design	Hassan Gomaa	Cambridge University Press	3	2004

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TYCS -46154

Reference Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Threat first Object oriented analysis & design	BreetMclaughline, Garry Police & Devide West.	OREILLY	1	2006
2	Object Oriented Analysis & design	Kahate	Tata McGraw-Hill	1	2007
3	Object oriented analysis & design using UML	H. Srimathi, H. Sriram, A.Krishnamoorthy	SCITECH PUBLICATION	2	2009
4.	Object-Oriented Analysis & design understanding system development with UML 2.0	Mike O'Docherty	John Wiley & Sons	3	2004

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TYCS-47/54

Course Details:

Class	B. Tech, Sem. VI
Course Code and Course Title	0CSPC359- Advanced Database System Laboratory
Prerequisite/s	0CSPC352- Database Engineering Laboratory
Teaching Scheme: Practical	02
Credits	01
Evaluation Scheme: ISE / ESE	50/ 50

Course Objectives:

01	To understand fundamental concept of object relation database system.
02	To Describe and compare parallel and distributed database system.
03	To describe database security, decision support and data mining concepts.
04	To evaluate and analyze different NoSQL,OLAP queries and data warehouse concept.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPC359_1	**Construct** complex data types by utilizing features of object based databases.(K^3)
0CSPC359_2	**Experiment with** distributed concurrency control protocols and joins concept in distributed DBMS.(K^3)
0CSPC359_3	**Analyzing** different types of algorithm using data mining(K^4)
0CSPC359_4	**Perform** different PL/SQL, NoSQL and OLAP queries on various databases. (S^2)
0CSPC359_5	**Follow** professional and ethical principles during laboratory work in a team for laboratory activities. (A^2)

Course Contents: It should consist of minimum 8-10 experiments based on following list.

1.	Create structured data types of ORDBMS and perform operations- create table using Structured data types, insert data and solve queries.
2.	Implement multivalued Attributes complex types and Inheritance in ORDBMS.
3.	Implementation of two phase and three phase commit protocol
4.	Implementation of Concurrency Control in distributed DBMS
5.	Implementation of semi join concept in distributed DBMS
6.	Implement parallel joins, sorting and aggregates
7.	Implement vertical and horizontal fragmentation in distributed DBMS
8.	Queries on PL/SQL Commands
9.	Write OLAP queries for given database schema.
10.	Implementation of data warehousing and decision support cube operator using OLAP queries
11.	Create a MongoDB Database and connect it to the java program apply different database operations on it.
12.	Implement a program that MongoDB with a collection and Insert document, Update document in to the collection.

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TYCS-48154

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Database system concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	Mc Graw Hill Education	6	2011
02	Database Systems- A practical approach to Design, Implementation	Thomos Connolly, Carolyn Begg	Pearson Education.	4	2009
03	Getting Started with NoSQL	Gaurav Vaish	Packet	2	2012
04	Database Management Systems	Raghu Ram Krishnan	McGraw Hill	3	2002

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Editions
01	Fundamentals of Database Systems	RamezElmasri and ShamkantNavathe	Pearson Education	4	2007
02	Database Systems: Design, Implementation and management	PeterRof, Carlos Coronel	Cengage Learning	7	2014
03	Principals of Database Systems	J. D. Ullman	Galgotia publications	1	2011
04	Sql: A Complete Reference	Alexis Leon	McGraw Hill Education	1	2002

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TYCS-49|54

Course Details:

Class	B. Tech, Sem. VI
Course Code and Course Title	0CSPC360 Web Programming
Prerequisite/s	0CSES253, 0CSES256
Teaching Scheme: Lecture/Tutorial/Practical	2/0/4
Credits	04
Evaluation Scheme: ISE/ESE	50/50

Course Objectives:

01	To introduce the concept of Search Engine basics.
02	To enable students to determine SEO Objective and develop SEO plan prior to Site Development.
03	To understand and make use of various approach to design responsive web applications with ASP .NET Framework, Xml, HTML 5 and CSS3
04	To develop java scripting skills with Javascript and Jquery.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPC360_1	**Describe** fundamentals of web programming.(K^2)
0CSPC360_2	**Develop** web page using different web programming techniques. (K^3)
0CSPC360_3	**Build** responsive Web Page.(S^3)
0CSPC360_4	**Build** simple websites by using CMS.(S^3)
0CSPC360_5	**Build** web application using Javascript and Jquery. (S^3)
0CSPC360_6	**Examine** the observations and determine the result of experiment. (A^2)

Course Contents:

Unit 1	**Responsive web design with HTML5 and CSS3** Getting started with HTML 5, CSS3 and Responsive web design, Media Queries: Supporting Differing Viewports, Embracing Fluid Layout, HTML 5 for Responsive Design, CSS3: Selectors, Typography and color Modes, Stunning Aesthetics with CSS3, CSS3 Transitions, Transformations and Animations, Conquer Forms HTML5 and CSS3.**Content Management System** Exploring CMS terminology, installation of CMS (Drupal/WordPress/Joomla), extending CMS, CMS theming, User management and permissions in CMS.	06 Hrs
Unit 2	**JavaScript &Jquery** Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web Browser environments, Manipulation using DOM, forms and validations, DHTML: Combining HTML, CSS and JavaScript, Events and buttons. Introduction to Jquery, basics of Jquery, santax selectors, events, Jquery HTML, Jquery examples.	04 Hrs

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Unit 3	**XML** Introduction to XML, uses of XML, simple XML, and XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT.	04 Hrs.
Unit 4	**Introducing ASP.NET, Namespaces & Client-Side Scripts** The Origins of ASP, ASP.Net engine, the ASP.NET Page Structure Options, and ASP.NET 4.5 Page Directives, Compilation, Master Page, Using Namespaces. HTML Server Controls, ASP.NET Web Server Control & Validation Server Controls, State Management Techniques, Database with ADO.NET-Overview of Ado.NET, Data components in Visual Studio .NET.	06 Hrs.
Unit 5	**Basics of PHP** Introducing PHP: History, General Language Feature PHP Basics: Embedding PHP code in Your Web Pages, Commenting Your Code, Outputting Data to the Browser, PHP supported Data Types, Identifiers, Variables, Constants, Expressions, String Interpolation, and Control Structures Functions: Invoking a Function, Creating a Function, Function Libraries Arrays, Object-Oriented PHP: The benefits of OOP, Key OOP Concepts, Constructor and Destructors, Static Class Members, The instance of Keyword, Helper Functions.	06 Hrs.
Unit 6	**Servlet and Java Server Pages (JSP)** Introduction to Servlet The servlet Lifecycle : The Servlet Alternative, Servlet Reloading, Init and Destroy, Single-Thread Model, Background Processing, Last Modified Time Session Tracking : User Authorization, Hidden Form Fields, URL Rewriting, Persistent Cookies, The session Tracking API Understanding the need for JSP, Evaluating benefits of JSP, Comparing JSP to other technologies, Installing JSP Pages, Creating Template Text, Invoking Java Code from JSP, Limiting the amount of Java Code in JSP, Using JSP Expression, JSP Expression, Example of JSP Expression, Writing Scriptlets, Scriplet examples, Scriplets for conditional execution,	04 Hrs.

	Experiments List:
1	Programs based on newly introduced elements of HTML5.
2	Programs based on different types of Selectors.
3	Programs based on Typography and background properties of CSS3, animation effect by using the transition feature of CSS.
4	Programs based on JavaScript operators, functions and objects.
5	Programs based on Jquery selectors, Jqueryevents.
6	Installation of CMS and designing web pages using CMS.
7	Program to demonstrate concept of DTD and its types.
8	XSLT styles-sheet to convert XML document to HTML.
9	Creating XML document using DOM.
10	Create an web application using ASP.Net.
11	program to access using DataSet in ASP.NET
12	program to implement PHP variables, Expression, arrays, control structure
13	Design a web form and validate it using PHP using regular expressions
14	Installation, Configuration of Tomcat Server and Deployment of Servlet based application

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TY CS+5\54

15	Program to demonstrate simple servlet.
16	Servlet to store data to database.
17	Write a JSP application to display database contents
18	Program to demonstrate state management in JSP

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Professional ASP.NET 4.5 in C#	John Wiley and Sons	WROX	1st	2013
02	Advanced Internet Technology	Deven Shah	Dreamtech Press	1	2015
03	XML in a Nutshell	Elliotte Rusty Harold, W. Scott Means	O'Reilly Publication	3	2004
04	Web Technologies: Black book	Kogent Learning Solutions Inc.	Dreamtech Press	1	2009
05	Web Content Management	Deane Barker	O'Reilly Media	1	2016

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Learning PHP, MySql, Java Script, CSS and HTML5	Robin Nixon	O'really	3	2014
02	Learning PHP, MySql, Java Script with JQuery, CSS and HTML5	Robin Nixon	O'really	4	2012
03	Search Engine Optimization All-in-One For Dummies	Bruce Clay	John Wiley & Sons	3	2015
04	Learning Responsive Web Design: A Beginner's Guide	Clarissa Peterson	O'Reilly Media, Inc.	1	2014
05	Microsoft ASP.NET 4	George Shepherd	Microsoft	1st	2010

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TYCS-52154

Course Details:

Class	B. Tech, Sem. VI
Course Code and Course Title	0CSAC315 - Soft Skills
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial	0/1
Credits	00
Evaluation Scheme: ISE	Grade

Course Objectives:

01	To improve professional and interpersonal skills.
02	To develop an interview skills of students.
03	To learn stress management techniques.
04	To develop team building skills and different life skills

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSAC315_1	**Comply** oneself with various personality traits (A^2)
0CSAC315_2	**Express** oneself professionally for different types of interview.(A^3)
0CSAC315_3	**Participate** in various activities related to teamwork and problem solving. (A^3)
0CSAC315_4	**Exhibit** positive attitude, work ethics and adaptability at work place.(A^5)
0CSAC315_5	**Organize** in various tasks related to cross occupational competency and life skills (A^3)

Tutorial List	
1	Tutorial on personality Development and behavioral Management.
2	Tutorial on Professional Etiquettes and Engineering ethics.
3	Tutorial on Do's and Don'ts in Extempore
4	Tutorial on Technical Writing
5	Tutorial on Do's and Don'ts in Group Discussion
6	Tutorial on Do's and Don'ts in Personal interview and HR interview
7	Tutorial on SWOT (Strength, Weakness, Opportunity, Threat) Analysis.
8	Tutorial on case study to find alternate solution of given problem
9	Tutorial on Do's and Don'ts in technical talk.
10	Tutorial on Do's and Don'ts in Seminar.
11	Tutorial on Stress Management.
12	Tutorial on convincing capabilities

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TYCS-53I54

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Personality Development and Soft Skills	Barun K. Mitra	Oxford	1	2011
02	75 Interview Questions and Answers	David Ngo	-	1	2012
03	Successful Strategies for Teams	Frances A. Kennedy, Linda B. Nilson	Team Member Handbook	3	2008
04	Soft Skills – Enhancing Employability: Connecting Campus with Corporate"	M S Rao	I K International Publishing House Pvt. Ltd	2	2011

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition s
01	Enhancing Soft Skills Through Learner Centered Activities at UG Level	Raj K Bharathi	LAP Lambert Academic Publishing	3	2016
02	VET Boost: Towards a Theory of Professional Competencies	Fritz K. Oser, Ursula Renold, Ernst G. John, Esther Winther, Susanne Weber	Sense Publishers	4	2016
03	The First Book of Life Skills	Larry James	Embassy Books	1	2006

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TY CS-54154

AnnasahebDange College of Engineering and Technology, Ashta

(An Autonomous Institute affiliated to Shivaji University, Kolhapur)

Curriculum Structure and Syllabus

B. Tech.
COMPUTER SCIENCE AND ENGINEERING

SEM VII& SEM VIII

(Academic Year 2020-21)

Department of Computer Science & Engineering

Teaching and Evaluation Scheme

B. Tech: VII Semester

CourseCode	Course	Teaching Scheme				Evaluation Scheme					
		L	T	P	Credits	Scheme	Theory Marks			Practical Marks	
							Max.	Min. for Passing		Max.	Min. for Passing
0CSPC401	Distributed and Cloud Computing	3	0	0	3	ISE I	10		40	--	--
						MSE	30			--	--
						ISE II	10			--	--
						ESE	50	20		--	--
0CSPC402	Big Data Analytics	3	0	0	3	ISE I	10		40	--	--
						MSE	30			--	--
						ISE II	10			--	--
						ESE	50	20		--	--
0CSOE4**	Open Elective	3	0	0	3	ISE I	10		40	--	--
						MSE	30			--	--
						ISE II	10			--	--
						ESE	50	20		--	--
0CSHS405	Project Management	3	1	0	4	ISE I	10		40	--	--
						MSE	30			--	--
						ISE II	10			--	--
						ESE	50	20		--	--
0CSPC451	Distributed and Cloud Computing Laboratory	0	0	2	1	ISE	--			50	20
						ESE	POE			50	20
0CSPC452	Big Data Analytics Laboratory	0	0	2	1	ISE	--			50	20
						ESE	POE			50	20
0CSPE4**	Professional Elective- IV	2	0	2	3	ISE	--			50	20
0CSPR456	Pre-project	0	0	5	5	ISE	--			50	20
						ESE	POE			50	20
0CSHS457	Design Thinking	0	0	2	1	ISE	--			50	20
Total		14	1	13	24		400			400	

Total Contact Hours/ Week: 28Hrs

HOD 22/06/2020

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B.Tech-ST-01/04

Professional Elective- IV
1. Deep Learning   - 53
2. Parallel Programming   -54
3. Advanced Web Programming -55

Open Elective

Course Name	Course Offered by
Industrial Management and Operational Research	Mechanical Engineering
Industrial Automation and Robotics	
Database Essentials and Business Intelligence - 0CSOE403	Computer Science and Engineering
Machine Learning - 0CSOE404	
Electrical and Hybrid Vehicles	Electrical Enginnering
Industrial Automation PLC and SCADA	
Air Pollution Control	Civil Enginnering
Disaster Management	
Research Methodology	
Hybrid Vehicles	Automobile Engineering
Experimental Aerodynamics	Aeronautical Enginnering
Introduction to Unnamed Aerial Vehicle	
Microcontroller and Interfacing	Electronics and Telecommunication
Image Processing	

Total Credits for semester VII:

Course Category	HS	BS	ES	PC	PE	OE	PR
Credits	5	-	-	8	3	3	5
Cumulative Sum	8	28	37	69	14	3	7

HOD   22/06/2020

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B.Tech - ST-02/04

Department of Computer Science & Engineering

Teaching and Evaluation Scheme
B. Tech.: VIIISemester

| Course Code | Course | Teaching Scheme | | | | Evaluation Scheme | | | | |
| | | | | | | | Theory Marks | | Practical Marks | |
		L	T	P	Credits	Scheme	Max.	Min. for Passing	Max.	Min. for Passing
0CSPE4**	Professional Elective- V	3	0	0	3	ISE I	10		--	--
						MSE	30		--	--
						ISE II	10	40	--	--
						ESE	50	20	--	--
0CSPE4**	Professional Elective- VI	3	0	0	3	ISE I	10		--	--
						MSE	30		--	--
						ISE II	10	40	--	--
						ESE	50	20	--	--
0CSPR458	Project Industry* or Institute	0	0	20#	20	ISE	--		50	20
						ESE	POE		50	20
Total		**6**	**0**	**20**	**26**		**200**		**100**	
Total Contact Hours/ Week: 26										

*Students opting for an industry-based project may use MOOCs for leaning professional electives. Professional Electives will be announced at the commencement of the semester based on the latest trends and the availability of courses on MOOCs. Blended learning strategy like flipped classroom can be used by the course coordinator.
For project, batch should be of 9 students.

#Student working hours:20
For project, faculty contact hours:10

Total Credits for semester VIII:

Course Category	HS	BS	ES	PC	PE	OE	PR
Credits	--	--	--	--	06	--	20
Cumulative Sum	8	28	37	69	20	3	27

22/06/2020

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B·Tech- ST–03/04

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Total Credits Category Wise/ Semester Wise:

Sem	HS	BS	ES	PC	PE	OE	PR	Total
I	3	8	13	-	-	-	-	24
II		8	16	-	-	-	-	24
III	-	8	4	12	-	-	-	24
IV		4	4	14			01	23
V				19	3	-	1	23
VI	-	-	-	16	8	-	-	24
VII	5	-	-	8	3	3	5	24
VIII	--	--	--	--	06	--	20	26
Total	8	28	37	69	20	3	27	192
%	4.16	14.58	19.27	35.93	10.42	1.56	14.06	100

22/06/2020

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B·Tech – ST-04/04

Course Details:

Class	B. Tech, Sem. VII
Course Code and Course Title	0CSPC401- **Distributed & Cloud Computing**
Prerequisite/s	0CSPC208
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

01	To make students understand distributed system paradigms &principles underlying the functioning of distributed systems
02	To make students understand the emerging area of cloud computing and how it relates to traditional models of computing.
03	Apply & analyze different cloud computing services & cloud security aspects.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC401_1	**Explain** the principles underlying the functioning of distributed systems (K^2)
0CSPC401_2	**Apply** the algorithms used in distributed system & visualize their working (K^3)
0CSPC401_3	**Explain** Cloud Infrastructure and their Components(K^2)
0CSPC401_4	**Make use of** different virtualization techniques(K^3)
0CSPC401_5	**Explain** various cloud computing services and data security aspects in cloud (K^2)

Course Contents:

Unit 1	**Distributed system paradigms** Definition, goals, architecture, Types of distributed system, Architectural styles, system architectures	05 Hrs.
Unit 2	**Processes, Communication & Synchronization** Threads, virtualization, remote procedure calls, distributed shared memory, synchronization, clock synchronization, logical clock, mutual exclusion, election algorithms	08 Hrs.
Unit 3	**Cloud Computing Basics** Cloud computing fundamentals, the role of networks in Cloud computing, Essential characteristics of Cloud computing, Cloud deployment model, Cloud service models, Multitenancy, Cloud cube model, Cloud economics and benefits, Cloud types and service scalability over the cloud, challenges in cloud NIST guidelines. **Cloud Computing Framework:** Amazon EC2, S3 storage revises, Aneka frame work	08 Hrs.
Unit 4	**Virtualization** Introduction &Benefits, Implementation levels of Virtualization, Virtualization at OS level, Virtualization structure, Virtualization Mechanism, Open source Virtualization Technology,	07 Hrs.

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B.Tech –CSE- 01/34

	XenVirtualizationArchitecture, Binary translation with full Virtualization, paravirtualization, Virtualization of CPU, memory and I/O devices	
Unit 5	**Exploring cloud services** Software as a Service – Overview, advantages, limits, virtualization benefits, examples. Platform as a Service – overview, advantages and functionalities, PaaS application frameworks – Drupal, Long Jump. Case study – Google Apps and Web Services.	08 Hrs.
Unit 6	**Data security in cloud** Security Overview, Cloud Security Challenges and Risks, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security. Identity and Presence, Identity Management and Access Control, Disaster Recovery in Clouds	06 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Distributed Systems-Principles & paradigms	Andrew S. Tanenbaum	Pearson	2nd	2015
02	Cloud Computing Bible	Barrie Sosinsky,	Wiley	-	2011
03	Cloud Computing Black Book	KailashJayaswalDr.Deven Shah	Dreamtech Press	-	2016

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Distributed Systems – Concepts & Design	George Koulouris, Jean Dollimore, TimKindberg	Pearson Education	3rd	2005
02	Cloud Computing Principles and Paradigms	RajkumarBuyya James Broberg, AndrzejGoscinski	Wiley	-	2013

HOD

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B·Tech-CSE- 02/34

Course Details:

Class	B.Tech. Sem-VII
Course Code and Course Title	0CSPC402 **Big Data Analytics**
Prerequisite/s	Database Engineering
Teaching Scheme: Lecture/Tutorial /Practical	03/00/00
Credits	03
Evaluation Scheme: ISE/MSE/ESE	10/30/10/50

Course Objectives: To

1	Provide probability based mathematical foundation essential for analysis of big data
2	Understand the fundamental concepts, principles of Data Science, business intelligence
3	Learn and explore the techniques and cutting edge tools such as PIG & HIVEetc. in Hadoop echo system for big data analysis
4	Learn to develop Data Analytics solutions using R programming

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC402_1	**Solve** examples using probability theory (K^3)
0CSPC402_2	**Explain** components of business intelligence environment and discuss structure of decision making process.(K^2)
0CSPC402_3	**Examine** big data andHadoop ecosystemtools (K^4)
0CSPC402_4	**Summarize**framework with respect to Hadoop (K^2)
0CSPC402_5	**Make use of** R language for Data Analytics(K^3)

Course Contents:

Unit No.	Unit name	Contact Hrs.

Unit 1	**Introduction to Statistics and Probability:**
	• The Engineering method and statistical thinking
	• Collecting Engineering data
	   ○ Retrospective study
	   ○ Observation
	   ○ Designed experiments
	• Introduction and framework
	   ○ Population
	   ○ Sample
	   ○ Observations
	   ○ Variables
	   ○ Data collection
		08 Hrs.

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B.Tech- CSE - 03/34

	• Sample space and events ○ Random Experiments ○ Sample Space ○ Events • Interpretation of probability ○ Introduction ○ Axioms of probability ○ Random variables	
Unit 2	**Business Intelligence and decision support system** • Effective and timely decisions • Data, Information and Knowledge • The role of mathematical models • Business intelligence architectures ○ Cycle of business intelligence analysis ○ Enabling factor in business intelligence projects ○ Development of business intelligence system • Ethics of business intelligence • Definition of system • Representation of the decision-making process • Definition of decision support system • Development of decision support system	07Hrs.
Unit 3	**Overview of Big Data** • What is Big Data • Evolution of Big Data • Structure of Big Data • Elements of Big Data • Big Data Analytics • Careers in Big Data • Future of Big Data	06Hrs
Unit 4	**Understanding Hadoop Ecosystem** • Hadoop Ecosystem • Hadoop Distribution file system • Map Reduce • Hadoop YARN • Introducing HBase • Hive • Pig and Pig Latin • Sqoop • Zookeeper • Flume • Oozies	08 Hrs.

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B·Tech – CSE – 04/34

Unit 5	**Understanding MapReduce and HBase**	06 Hrs.
	• The map reduce Framework • Techniques to Optimize MapReduce Jobs • Use of MapReduce • Role of HBase in Big Data Processing • Exploring the Big data Stack • Virtualization and Big Data	
Unit 6	**Exploring R:**	07 Hrs.
	• Exploring basic feature of R • Exploring RStudio • Handling basic expression in R • Basic arithmetic in R • Mathematical operation • Variables in R • Handling data in R Workshop • Reading datasets and exporting data from R • Manipulating and processing data in R	

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introduction to static and data analysis	Christian Heumann · Michael SchomakerShalabh,	Springer	1	2016
02	Applied Statisticsand Probabilityfor Engineers	Douglas C. Montgomery And George C. Runger	John Wiley & Sons, Inc.	3	20
03	Big data Black Book	DT Editorial	Dreamtech Press Edition	1	2016
04	Business Intelligence	Carlo Vercellis	Wiley	1	Reprint 2017

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Hadoop : The Definitive Guide	Tom White	O'REILLY Publication	3	2015
02	Big Data and Analytics	SeemaAcharya and Subhashini Chellappan	Wiley India	1	2015
03	Regression Analysis by Example	SampritChatterjee, Ali S. Hadi	Wiley	5	2006
04	An Introduction to Statistical Learning with	Daniela Witten, Trevor Hastie,	Springer	1	2017 Reprint

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B·Tech - CSE - 05/34

	Applications in R	Robert Tibshirani			
05	Introductory statistics with R	Peter Dalgaard	Springer	2	2018
06	Introduction to Probability and Statistics for EngineersandScientists	Sheldon M. Ross	Elsevier Academic Press	3	2004

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B.Tech - CSE - 06/34

Department of Computer Science & Engineering

Course Details:

Class	B. Tech, Sem. VII
Course Code and Course Title	0CSOE403- OPEN ELECTIVE: **Database Essentials and Business Intelligence**
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

01	To enable the students understand various functional components of database system and basic concepts of conceptual database design.
02	To give the students insight of using conceptual and relational models to prepare database schemas to solve real-world problems.
03	To make the students learn SQL with various DDL and DML constructs.
04	To make the students aware about basic BI concepts, various frameworks, applications and few commercial tools.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSOE403_1	**Explain** concepts of database system, conceptual database design, relational database model and SQL (K^2)
0CSOE403_2	**Design** ER diagram for the enterprise as well as prepare the relational database schema for the enterprise using integrity constraints (K^3)
0CSOE403_3	**Write** queries in SQL (DDL and DML) to design database and extract required information from the database. (K^3)
0CSOE403_4	**Explain and Interpret** the basic concepts in Business Intelligence (K^2)
0CSOE403_5	**Explain** concepts of data integration with various approaches demonstrating various case studies (K^2)

Course Contents:

Unit 1	**Introduction to databases** General introduction to database systems, its advantages and applications, View of Database – Levels of data abstraction, Data models, Database languages, Database System Architecture, Database users and Administrator	05 Hrs.
Unit 2	**Database Models** **ER Model:** Entity set, Entity types, attributes, Notations, Relationship sets, Relationship types, Keys- super key, candidate key, primary key, Extended Features of ER Model-Generalization, Specialization and aggregation Real-world problem designs **Relational Model:** Structure of Relational Database, Reduction of ER model into Relational schemas, Schema-instance distinction, Referential integrity and foreign keys	07 Hrs

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B.Tech -CSE - 07/34

Unit 3	**Structured Query Language** Introduction to SQL, Data definition statements with constraints, Insert, Update and Delete, Set Operations, Aggregate functions group by and having clauses, Nested Queries, Views, Complex Queries, Joins.	09 Hrs.
Unit 4	**Introduction to Business Intelligence** **Introduction:** Introduction to digital data and its types – structured, semi-structured and unstructured, Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP). **Basics of BI:** BI Definitions & Concepts, BI Framework, Data Warehousing concepts and its role in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI	10 Hrs.
Unit 5	**Data Integration & Data Processing** Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Meta data –types and sources. Introduction to data quality, data profiling concepts and applications	06 Hrs.
Unit 6	**Case study of open source / commercial BI tools** Oracle / IBM / Microsoft BI suite, tools: architectures, design and deployment of BI in different domains using these tools.	05 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Database system concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	McGraw Hill Education	6	2011
02	Database Systems- A practical approach to Design, Implementation	Thomos Connolly, Carolyn Begg	Pearson Education.	4	2009
03	Database Systems – Design, Implementation and Management	Rob & Coronel	Thomson Course Technology	5	2008
04	Fundamentals of Business Analytics	R.N. Prasad and SeemaAcharya	Wiley publication	2	

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B.Tech – CSE – 08/34

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Database Systems: Design, Implementation and management	Peter Rof, Carlos Coronel	Cengage Learning	7	2014
02	Principles of Database Systems	J. D. Ullman	Galgotia publications	1	2011
03	SQL: A Complete Reference	Alexis Leon, Mathews Leon	McGraw Hill Education	1	2002
04	White papers and manuals / documentation from Oracle / IBM / Microsoft site on BI suite / tools.				·

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B.Tech- cse- 09/34

Course Details:

Class	B. Tech, Sem. VII
Course Code and Course Title	0CSOE404-OPEN ELECTIVE:**Machine Learning**
Prerequisite/s	Basic Linear Algebra, Statistics and Probability
Teaching Scheme: Lecture/Tutorial	3/0
Credits	03
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

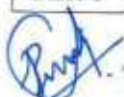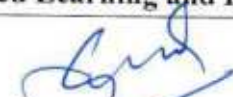| **Course Objectives:**	
1	To introduce some of the basic concepts of machine learning from a mathematically well motivated perspective
2	To make the students understand and use various machine learning algorithms
3	To enable students to identify appropriate machine learning algorithms to solve problems in variety of domains pertaining to their respective field of engineering study.

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPE404_1	**Explain** the fundamentals, challengesof machine learning (K2)
0CSPE404_2	**Describe** various machine learning algorithms (K2)
0CSPE404_3	**Demonstrate** the working of various machine learning algorithms with mathematical justifications for sample real-world data (K3)
0CSPE404_4	**Demonstrate** and **use** various machine learning algorithms and models (K3)
0CSPE404_5	**Comprehend** strengths and weaknesses of various machine learning approaches and use appropriate machine learning algorithms for real-world applications. (K3)

Course Contents:

Unit 1	**Introduction** Introduction to Machine Learning, Applications, History of machine learning, Types of Learning, Hypothesis space, performance evaluation, cross-validation	6 Hrs.
Unit 2	**Regression and Decision Trees** Simple and Multiple Regression – Gradient Descent and Normal Equations, Logistic Regression, Regularization Decision Tree representation– ID3 algorithm Application/ Case Study	8 Hrs.
Unit 3	**Instance Based Learning and Feature Selection**	7

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B.Tech-csE-10/34

			Hrs.
	k-nearest neighbor, Distance weighted nearest neighbor algorithm, Curse of Dimensionality, feature selection – filter methods, wrapper methods, feature extraction– PCA Application/ Case Study		
Unit 4	**Probability and Bayes Learning** Bayes Theorem, Bayes Optimal Classifier, Naïve Bayes Classifier Application/ Case Study		6Hrs.
Unit 5	**Support Vector Machines and Neural Network** Introduction to support Vector Machine, Linear SVM – Optimal Margin Classifier, Soft Margin Classifier/maximum margin with noise, non-linear SVM, Kernel Functions, Multi-class SVMs Introduction to neural network, Perceptron, Perceptron Learning, Multilayer neural network, backpropagation, Introduction to deep neural network. Application/ Case Study		10 Hrs.
Unit 6	**Clustering** Introduction to clustering, k-means clustering, Hierarchical Clustering Application/ Case Study		5 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Machine Learning	Tom Mitchell	McGraw-Hill	1st	1997
02	Introduction to Machine Learning	EthemAlpaydin	The MIT Press	2nd	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Elements of Statistical Learning	T. Hastie, R. Tibshirani, J. Friedman		2nd	2008
02	NPTEL course Introduction to Machine Learning	Prof. SudeshnaSarkar	NPTEL	-	-
03	Coursera Machine Learning	Prof. Andrew Ng	Coursera / Stanford university	-	-

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B.Tech-CSE – 11/34

Department of Computer Science & Engineering

Course Details:

Class	B. Tech.,Sem. VII
Course Code and Course Title	0CSPC405- Project Management
Prerequisite/s	0CSPC205- Software Engineering
Teaching Scheme: Lecture/Tutorial	3/1
Credits	04
Evaluation Scheme: ISE I / MSE / ISE II / ESE	10/30/10/50

Course Objectives:

1	To provide students with a basic understanding of project management principles and practices.
2	To demonstrate competency in the creation and management of a project plan
3	To understanding impact of Scope, Time and Cost management
4	To understanding the software quality metrics and quality assurance
5	To develop strategies to calculate risk factors involved in IT projects

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC405_1	**Disseminate** project management framework and involved in each phase(K^2)
0CSPC405_2	**Classify** the importance of project plan.(K^4)
0CSPC405_3	**Apply** the relationship between scope, cost, time in project(K^3)
0CSPC405_4	**Summarize** the software quality metrics.(K^5)
0CSPC405_5	**Recognize** the importance of good communication and relationship between stakeholders for resolving issues. (S^1)
0CSPC405_6	**Examine** the observations and identifythe risk factors during project development. (A^2)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Introduction to Project Management** Project and Project Management (PM), Role of project Manager, System view of PM, Organization, Stakeholders, Project phases and lifecycle, Context of IT projects, process groups, mapping groups to Knowledge areas, Project Management tools	06 Hrs.
Unit 2	**Project Integration Management** Strategic planning and project selection, Developing a Project Management Plan, Directing and Managing Project Work, Monitoring and Controlling Project Work, Performing Integrated Change Control, Closing Projects or Phases	06 Hrs.

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B.Tech-CSE - 12/39

Unit 3	**Project Scope, Time and Cost management** Planning Scope Management, Collecting Requirements, Defining Scope, Validating Scope, Controlling Scope, Planning Schedule Management, Defining Activities, Sequencing and Estimating Activity, Resources & Duration, Developing & Controlling Schedule Basic Principles of Cost Management, Planning Cost Management, Estimating Costs	09 Hrs.
Unit 4	**Quality Management** Importance, Planning Quality Management, Performing Quality Assurance, Controlling Quality, Tools and Techniques for Quality Control, Modern Quality Management, Improving IT Project Quality	07 Hrs.
Unit 5	**Human Resource management** Importance, keys to managing people, human resource planning, acquiring, developing and Managing project team, software assistance.	07 Hrs.
Unit 6	**Risk management** Importance, risk management planning, sources of risk, risk identification, qualitative and quantitative risk analysis, risk response planning, risk monitoring and control.	07 Hrs.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Information Technology Project Management.	Kathy Schwalbe	Thomson Course Technology	7th	2007
2.	A guide to the Project Management Body of Knowledge	AndrewS. Tanenbaum	PrenticeHall	5th	2011
3.	Project Management Paperback	B. A. Forouzan	TMG Hill	4th	2010
4.	Bankers' Handbook on Credit Management (IIBF)	KuroseJ.F.and RossK.W.	AddisonWesley	3rd	2004

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Project Management Core Textbook	Mantel Jr., Meredith, Shafer, Sutton with Gopalan	Wiley	1st	2006
2.	Project Management	Harold Kerzner	Wiley	10th	2013
3.	Project Management: A Systems Approach to	NataliaOliferand VictorOlifer	WileyIndiaEdition	1st	2009

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B.Tech-CSE - 13/35

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Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
	Planning, Scheduling, and Controlling				
4.	Project Management Lite	ComerD.E. and DromsR.E	Prentice-Hall	4th	2004

Tutorial Questions:

Tutorial No.1

Develop a project management plan of your final year project which includes introduction or overview of the project, description of how the project is organized, management & technical processes used on the project, work to be done, schedule and budget information.

Tutorial No.2

Solve any project management problem by using Liquid Planner

Tutorial No. 3

Solve any project management problem by using Jira tool

Tutorial No. 4

Prepare a project charter of your final year project which defines project start date & end date, key schedule milestones, budget information, project manager, objectives, project success criteria and approach

Tutorial No.5

Prepare a Gantt Chart for Library Management System.

Tutorial No.6

Solve any problem of project management by using Bridge24

Tutorial No.7

Solve any problem of project management by using Builder trend software

Tutorial No.8

Prepare a network diagram of railway reservation system.

Tutorial No.9

Solve any problem of project management by using Workflow ax

Tutorial No.10

Solve any problem of project management by using Build Tools software

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B.Tech-CSE – 14/35

Course Details:

Class	B. Tech, Sem. VII
Course Code and Course Title	0CSPC451- Distributed & Cloud Computing Laboratory
Prerequisite/s	0CSES257
Teaching Scheme: Practical	02
Credits	01
Evaluation Scheme: ISE / ESE	50/ 50

Course Objectives:	
01	To make students understand distributed system paradigms &principles underlying the functioning of distributed systems
02	To make students understand the emerging area of cloud computing and how it relates to traditional models of computing.
03	Apply & analyze different cloud computing services & cloud security aspects.

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
0CSPC451_1	**Develop** the communication among processes at different hosts and apply the algorithms used in distributed system. (K^3)
0CSPC451_2	**Build** highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud(K^6)
0CSPC451_3	**Apply** various virtualization techniques(K^3)
0CSPC451_4	**Debate** on various cloud platforms and their services(A^3)
0CSPC451_5	**Communicate** effectively in lab with orally and writing journals.(S^3)

Course Contents:	
1	Program based on Remote procedure call using RMI
2	Program based on clock synchronization
3	Program based on Mutual Exclusion
4	Configuration of Private Cloud (Openstack/Eucalyptus)
5	Implementation of Virtualization in Cloud Computing to Learn Virtualization Basics, Benefits of Virtualization in Cloud using Open Source Operating System.
6	Write a Program to Create, Manage and groups User accounts in own Cloud by Installing Administrative Features.
7	Case study on Amazon EC2 to learn about Amazon EC2,Amazon Elastic Compute Cloud is a central part ofAmazon.com's cloud computing platform, Amazon Web Services. How EC2 allows users torrent virtual computers on which to run their own computer applications.
8	Case study on Microsoft azure to learn about Microsoft Azure is a cloud computing platform and infrastructure, created by Microsoft, for building, deploying and

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B.Tech - CSE - 15/34

		managing applications and services through a global network of Microsoft-managed data-centers. How it work, different services provided by it.
	9	Design and develop custom Application (Mini Project) using Salesforce Cloud.
	10	Assignment to install and configure Google App Engine.
	11	Design an Assignment to retrieve, verify, and store user credentials using Firebase Authentication, the Google App Engine standard environment, and Google Cloud Data store.
	12	Creating an Application in SalesForce.com using Apex programming Language.
	13	Design an Assignment based on Working with Manjrasoft Aneka Software.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Distributed Systems- Principles & paradigms	Andrew S. Tanenbaum	Pearson	2nd	2015
02	Cloud Computing Principles and Paradigms	RajkumarBuyya James Broberg, AndrzejGoscinski	Wiley	1st	2013
03	Cloud Computing Black Book	KailashJayaswal Dr. Deven Shah	Dreamtech Press	1st	2016
04	Cloud Computing: A Practical Approach for Learning and Implementation	A. Srinivasan	Pearson	1st	2014

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Distributed Systems – Concepts & Design	George Koulouris, Jean Dollimore, TimKindberg	Pearson Education	3rd	2005
02	Cloud Storage Security: A Practical Guide (Computer Science Reviews and Trends)	Aaron Wheeler (Author), Michael Winburn (Author)	Elsevier	1st	2015
03	Spatial Cloud Computing: A Practical Approach	Chaowei Yang	CRC Press	1st	2017

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B.Tech-CSE - 16/39

Department of Computer Science & Engineering

Course Details:

Class	B.Tech. Sem-VII
Course Code and Course Title	0CSPC452Big Data Analytics Laboratory
Prerequisite/s	Database Engineering
Teaching Scheme: Lecture/Tutorial /Practical	00/00/02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 50

Course Objectives:

1	To understand big data analytics as the next wave for businesses looking for competitive advantage.
2	To study components of decision making process and data analytics
3	To introduce big data challenges
4	To deal with data using Hadoop echo system and R
5	To describe different task and techniques to deal with data

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPC452_1	**Explain**need of Data Analytics. (K^2)
0CSPC452_2	**Analyze**data processing using Hadoop Ecosystem tools (K^4)
0CSPC452_3	**Make Use of** R programming for data processing (K^3)
0CSPC452_4	**Demonstrate** programs using analytics tools(S^2)
0CSPC452_5	**Follow** given instructions during practical performance. (A2)

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B.Tech-CSE- 17/35

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Laboratory Plan

Expt. No.	Title of Experiment	Planned Week
1	Installation of Hadoop	1
2	Implement the following file management tasks in Hadoop: • Adding files and directories • Retrieving files • Deleting files	2
3	Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm. • Find the number of occurrence of each word appearing in the input file(s) • Performing a MapReduce Job for word search count (look for specific keywordsin a file)	3
4	Dealing with Cloudera /IBM InfoSphere Insights	4
5	Hadoop Hive DDL commands, like create database, Viewing database, Droppingdatabase	5
6	Hadoop Hive DML commands like Insert, delete, update, data retrieval queries	6
7	Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data	7
8	Installation of R	8
9	Declaring variables expressions, functions and executing R script	9
10	Working with R with data sets- create, read, write and R Tables- create, read, write.	10
11	Manipulating and processing data in R- merging datasets, sorting data, putting data into shape	11
12	Dealing with graphs using R	12

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Business Intelligence – Data Mining and optimization forDecision Making	Carlo Vercellis-	Wiley	1	Reprint 2017
02	Big Data and Analytics	SeemaAcharya and Subhashini Chellappan	Wiley India	1	2015
03	Big Data (Black Book)- DT Editorial Services	DT Editorial	Dreamtech Press Edition	1	2016

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B.Tech -CSE- 18/35

04	Data mining Introductory and Advanced topics	Margaret H. Dunham	Pearson Education	3	2008

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Data Mining: Concepts and Techniques	Jiawei Han and MichelineKamber	Morgan Kaupmann	3	2011
02	R For Data Science	Hadley Garrett Grolemund Wickham,	O'REILLY	1	2016
03	"Analytics in a Big Data World: The Essential Guide to DataScience and its Applications	Bart Baesens	John Wiley & Sons	1	2014
04	Big-Data-Analytics-with-R-and-Hadoop	VigneshPrajapati	PACKT	1	2013

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B.Tech-CSE - 19/35

Course Details:

Class	B. Tech, Sem. VII
Course Code and Course Title	0CSPC453- Deep Learning
Prerequisite/s	Machine Learning Basic calculus (derivatives) Basic linear algebra (matrices, vectors) Basic probability and statistics Programming experience in Python or MATLAB
Teaching Scheme: **Lecture/Tutorial/Practical**	2/0/2
Credits	03
Evaluation Scheme: ISE/ESE	50/50

Course Objectives:	
01	To make the students understand the basic concepts of neural networks and deep learning networks
02	To introduce different models of deep learning to work with various types of inputs
03	To aware students about effects of different parameters and hyper-parameters on deep learning model output
04	To build simple learning systems to understand their mathematical foundations
05	To dive into fully connected deep networks for various applications
06	To be able to autonomously extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation and apply the same building applications with effective demonstrations.

Course Outcomes (COs):	Upon successful completion of this course, the student will be able to:
0CSPE453_1	Describe the fundamentals of neural networks (K2)
0CSPE453_2	Design feed forward networks with backpropagation (K3)
0CSPE453_3	Develop different deep learning models for given tasks (K3)
0CSPE453_4	Formulate & analyze the correct parameters and hyper-parameters of developed model for getting improved performance (K4)
0CSPE453_5	Build real-world applications using deep learning mechanisms and demonstrate effectively with verbal and written skills (K6)

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B.Tech - CSE - 20/35

Course Contents:

Unit		
Unit 1	**Introduction** **Shallow feedforward neural networks representation:** Multilayer perceptron (MLP), representation power of MLPs, Activation functions: linear & nonlinear activation functions, Derivatives of activation functions	03 Hrs.
Unit 2	**Optimization Techniques:** Gradient descent and the backpropagation algorithm, Saddle point problem in neural networks, the vanishing gradient problem and ways to mitigate it, Regularization methods (dropout, drop connect, batch normalization), RelU Heuristics for avoiding bad local minima, Heuristics for faster training, Nestors accelerated gradient descent	04 Hrs.
Unit 3	**Convolutional Neural Networks (CNN):** Introduction to CNN, Building blocks of CNN, Transfer Learning, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing CNNs, Guided Backpropagation, Fooling Convolutional Neural Networks.	04 Hrs.
Unit 4	**Autoencoders:** Autoencoders, Regularization in autoencoders, Denoisingautoencoders, Sparse autoencoders, Contractive autoencoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods	04 Hrs.
Unit 5	**Recurrent Neural Networks (RNN):** Introduction to RNN, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs	04 Hrs.
Unit 6	**Case Study& Applications of Deep Learning** **Applications of Deep Learning Computer Vision:** Image segmentation, object detection, automatic image captioning, Classification using Convolutional Neural Networks **Applications of Deep Learning to NLP:** Introduction to NLP and Vector Space Model of Semantics, **Word Vector Representations:** Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW) **Applications of Deep Learning to Unsupervised Learning**	05 Hrs.

Experiment List:

1	Installing of Anaconda or Miniconda and working with Tensorflow and Keras
2	Introduction and working with Google Colab for using GPUs and TPUs for large projects
3	Developing simple perceptron (single layer neural network)
4	Developing simple multilayer neural network for different tasks
5	Designing and developing basic CNN for given task
6	Using transfer learning in CNN
7	Designing and developing simple RNN for given task
8	Designing and developing RNN with LSTM for given task
9	Designing and developing model for Text generation using LSTM
10	Designing and developing model for Autoencoder for classification
11	Designing and developing model for Autoencoder for Dimensionality reduction

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B.Tech -CSE - 21/35

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Deep Learning	Ian Goodfellow	The MIT Press	-	2016
02	Pattern Recognition and Machine Learning	T2. Bishop, C. , M.,	Springer	1st	2006
03	Neural Networks: A Systematic Introduction	Raúl Rojas			1996

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Deep Learning with Python	Francois Chollet,	Manning Publications	1st	2017
02	TensorFlow for Deep Learning	Reza BosaghZadeh, BharathRamsundar,			2018
03	Matrix Computations	Golub, G.,H., and Van Loan,C.,F	JHU Press		2013

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B Tech - CSE - 22/35

Course Details:

Class	B. Tech, Sem. VII
Course Code and Course Title	0CSPE454 Parallel Programming
Prerequisite/s	0CSPC210 Computer Architecture
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	03
Evaluation Scheme: ISE	50

Course Objectives:

1	To learn parallel architecture basics and parallel algorithm design
2	To learn parallel program design methodology using Open MP
3	To learn parallel program design methodology using MPI.
4	To learn Basic of GPGPU, CUDA Memory model and Architecture.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPE454_1	**Comprehend** parallel algorithm design and taxonomy of parallel architecture (K2)
0CSPE454_2	**Apply** OpenMP and MPI directives and libraries to implement parallel program (K3)
0CSPE454_3	**Develop** different CUDA programs (K3)
0CSPE454_4	**Compare** the sequential and parallel approach of various problems with help of OpenMP, MPI, CUDA platform implementations. (K4)
0CSPE454_5	**Justify** use of different tools like cuDNN, Digits etc based on given application problems. (K5).
0CSPE454_6	**Demonstrate** parallel programming directives to solve problems (S3)
0CSPE454_7	**Follow** professional and ethical practices during laboratory work for given laboratory activities.(A2)

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	**Introduction** Taxonomy of parallel architecture, Interconnection networks,	4 Hrs
Unit 2	**Parallel algorithm design** Parallel programming models and tools, methodological design of parallel algorithm, Task channel method, finding the maximum	4 Hrs
Unit 3	**Open MP** Shared memory programming, Parallel for loop, critical section, reduction, performance improvement	6 Hrs

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B.Tech - CSE - 23/35

Unit 4	**MPI** MPI Model, MPI Interface, Collective communication	6 Hrs
Unit 5	**CUDA** GPGPU Architecture of NVIDIA, CUDA Model, Programming in CUDA	6 Hrs
Unit 6	**Application Scalability** HPC Application Development	2 Hrs

Course Contents:

Expt. No.	Title of Experiment	Contact Hours
1	Study of Processor architecture and networking.	2 Hrs
2	Analytical modeling of sequential algorithm.	2 Hrs
3	Feasibility study of parallel approach.	2 Hrs
4	2-3 Problem statements based on Open MP Programming	4 Hrs,
5	2-3 Problem statements based on MPI Programming	4 Hrs
6	2-3 Problem Statements based on CUDA	4 Hrs
7	Study of advanced parallel tools like OpenACC, Digits, CuDNN	2 Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	An Introduction to Parallel Programming	Peter S. Pacheco	Morgan Kaufmann	--	2011
02	Parallel programming in C with MPI and OpenMP	Michael J Quinn	Tata McGraw Hill	--	2003
03	Programming Massively Parallel Processors	David B. Kirk and Wen-mei W. Hwu	Morgan Kaufmann	2nd Edition	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introduction to Parallel Computing	AnanthGrama, George Karypis, Vipin Kumar &Anshul Gupta	Pearson Education Limited	Second Edition	2003
02	Multi-core Programming	ShameemAkhter and Jason Roberts	Intel Press	--	2006
03	CUDA Programming: A Developer's Guide to	Shane Cook	Elsevier Inc	First Edition	2013

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B.Tech-CSE-24/3

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
	Parallel Computing with GPUs				
04	OpenMP Programmer's Manual	-	-	-	-
05	MPI Programmer's Manual	-	-	-	-

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B-Tech-CSE-25/34

Department of Computer Science & Engineering

Course Details:

Class	B. Tech, Sem VII
Course Code and Course Title	0CSPE455 Advanced Web Programming
Prerequisite/s	0CSPC360Web Programming
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	03
Evaluation Scheme: ISE/ESE	50/50

Course Objectives:

01	To introduce Angular for developing modern, complex, responsive and scalable web applications.
02	To understand architecture of an Angular application.
03	To understand single-page applications with modern JavaScript frameworks.
04	To develop web application using Angular and other back end technologies.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPE 455_1	**Demonstrate** fundamentals of web programming.(K^3)
0CSPE 455_2	**Develop** web application using different web programming techniques. (K^6)
0CSPE 455_3	**Build** responsive Web application.(S^3)
0CSPE 455_4	**Build** simple web application by using AngularJS,NodeJs,ExpressJS.(S^3)
0CSPE 455_5	**Examine** the observations and determine the result of experiment. (A^2)

Course Contents:

Unit 1	**Responsive Web Designing** Introduction, Viewport, Grid View, Image, Video Media Queries, RWD frameworks Twitter Bootstrap : Introduction, Grid Basics, Typography, Tables, Images, Jumbotron, Well, Alerts, Button, Button Group, Glyph icons, Borders, Labels, Progress bar, Pagination, Pager, List groups, Panels, Dropdown, Collapse, Tabs, Navbar, Forms, Inputs, Input sizing, Media	04 Hrs
Unit 2	**Introduction to Typescript** Overview, Angular features , Angular Configurations, Angular Architecture, Setup(Commands), OOP concepts,NPM,Nod installations(newer versions…), Angular MVVM architecture, Create project and components commands, Scalable structure, application flow e2e, Basic syntax, Type, Variables, Operators, Decision Making, Function, Loops, Function, Numbers, String, Array, Tuples, Union, Interfaces, Classes, Objects, Namespaces, Modules, Ambients.	05 Hr

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B.Tech - CSE -26/34

Unit 3	**Fundamentals of Angular** Angular components,Services,templates,templateUrl,Lifecycle Hooks, Component interaction, module,Two way data-binding([(ngModel)]) Routing: Base path, Lazy loading, app-routing module. Displaying Data (Using interpolation, array, Directives (*ngIf,*ngFor)). Introduction to modules, Introduction to components, Introduction to services and DI	05 Hrs
Unit 4	**Working with Angular** Displaying data, Template syntax, User Inputs, Lifecycle hooks, Component interaction, component style, Angular element, Dynamic components, Attribute Directives and structural directives, Pipes. Reactive forms, Template Driven Forms, Form Validation, Dynamic Forms, Bootstrapping, NgModules introduction, JSModulesvsNgModules, Frequently used NgModules, Types of feature modules, Entry component, Feature Modules, Providers, SingletonServices , Sharing NgModule, NgModule API.	06 Hrs.
Unit 5	**NodeJS,ExpressJs and VueJS** NodeJs architecture ,Modules: Built-in and custom, Event loop, Asynchronous application , Testing node application, Introduction to ExpressJs, Routing, Template engines, Middleware, Web Application components, Error handling, Testing application Express application. Fundamentals of VueJS, Handling User Input, Classes, Computed properties and watchers, Class and style bindings Event rendering , Event Handling, Form Input bindings, Component basics Dynamic and async components	06 Hrs.
Unit 6	**Mongodb** Relational vsNoSQL DB, MongoDB fundamentals, Data modeling , Aggregation pipeline, Grid FS, Performance optimization	02 Hrs.

Experiments List:

1	Design a web page using bootstrap
2	Design a web page using basics of typescript
3	Design a web page using object oriented concepts
4	Design a web application to place an order of purchase using angularJS directives.
5	Design SPA interface using AngularJS.
6	Implementation of template driven form and validate it.
7	Design a web application using NodeJS
8	Design a web application using ExpressJS
9	Design a web application using VueJS
10	Design a web application to perform CRUD operations on database.

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B:Tech-CSE-27/34

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	MEAN Web Development	Amos Haviv	Packt publishing	2nd	2016
2	Full Stack JavaScript Development with MEAN	Colin J. Ihrig,	Sitepoint publishing	--	2015
3	Getting MEAN with Mongo, Express, Angular, and Node	Simon Holmes	Manning Publishing	2nd	2015

Web Resources:

1. https://www.tutorialspoint.com/typescript/
2. https://www.w3schools.com/angular/default.asp
3. https://angular.io/
4. https://www.w3schools.com/nodejs/default.asp
5. https://expressjs.com/
6. https://www.mongodb.com/

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B.Tech-CSE - 28/34

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Course Details:

Class	B. Tech, Sem. VII
Course Code and Course Title	0CSPR456- Pre-Project
Prerequisite/s	0CSPR356
Teaching Scheme: Lecture/Tutorial/Practical	0/0/5
Credits	05
Evaluation Scheme: ISE/ESE	50/50

Course Objectives:

01	To make the students read research papers, documents and blogs related to latest technological trends to come-up with their topic of interest boosting their self-learning abilities
02	To make the students undergo project management techniques, report writing/presentation skills
03	To acquire ability to map technical skills to real life applications through modeling.
04	To inculcate the habit of teamwork, leadership, finding flaws and fixing them
05	To allow students to make use of latest tools and technologies (in the domain of their interest) from the industry

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSPR456_1	**Identify** and formulate the real-world problem for their major project in the field of their own interest (K2)
0CSPR456_2	**Survey** technical literature, blogs, documents about latest technological trends etc. to come-up with an innovative idea for technical project (K2)
0CSPR456_3	**Analyze** the hardware and/or software requirements of the proposed work (K4)
0CSPR456_4	**Identify** and use relevant tools (from industry) and technologies for documentation, designing, coding, testing and debugging the software / hardware pertaining to their major project (K3)
0CSPR456_5	**Defend** or argue or appraise the results obtained during project work (K5)
0CSPR456_6	**Design** the prototype of the selected idea (K6)
0CSPR456_7	**Exercise** all the managerial (project planning, scheduling) and behavioral skills in a team to accomplish the goals of their project (A3)
0CSPR456_8	**Develop** summarizing, writing, documentation and presentation skills to showcase their ideas in the conferences / journals leading to effective communication. (S3)

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B.Tech-CSE- 29/34

Course Contents:

1. Pre-project work is to be carried out in the group of three to four students.

   Someone has said that choosing teammates for project is way more significant than choosing life partner. So here you will develop team building skills. On the contrary, students must learn how to adjust with unknown team members and get the work done.

2. Pre-project is intended to help the students become better learners and better engineers.

3. The students shall select the project by reviewing the literature in the domain of their interest and with the consultation of the respective supervisor / guide and approval from the department and submit the brief document discussing outline of the project with clear objectives

4. The students are encouraged to acquire and exercise professional skills such as inter-personal communication, presentation skills etc.

5. The students shall be exposed to all the standard tools used in the industry with help of industry experts.

6. The skills that students acquire during pre-project are intended to make them better prepared for accomplishing their Major project with a great success.

7. The students are supposed to learn to manage time to achieve the scheduled milestones of their project work.

8. Students shall be trained on how to get prepared to change their (or company's) plans midway. Adapt and survive.

9. Students should maintain a project log book containing weekly progress of theproject.

10. Duringsemester project will be evaluated progress-wise as per the project calendar provided by thedepartment.

11. The students will prepare a prototype of their work by the end of the semester and it will be showcased along with a technical poster in the event organized by the department.

12. Pre-project report should be prepared using Latex and submitted in soft and hardform

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B.Tech-CSE- 30/35

Course Details:

Class	B. Tech, Sem. VII
Course Code and Course Title	**0CSHS457- Design Thinking**
Prerequisite/s	--
Teaching Scheme: Theory/Practical	0/2
Credits	01
Evaluation Scheme: ISE	50

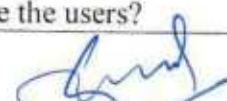| Course Objectives:	
1.	To familiarize students with design thinking concepts and principles as a tool for innovation
2.	To know the various frameworks used in Design Thinking
3.	To expose the student with state of the art perspectives, ideas, concepts, and solutions related to the design and execution of innovation driven projects using design thinking principles
4.	To explore ways to solve problems from end users' perspective
5.	Provide an authentic opportunity for students to develop teamwork and leadership skills

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

0CSHS457_1	**Develop** a strong understanding of the Design Process and propose a concrete, feasible, viable and relevant innovation project/challenge (K^3)
0CSHS457_2	**Recognize** the latest and future issues / challenges in innovation and apply the design thinking approach to model real world situations (K^3)
0CSHS457_3	**Create** physical prototypes / a visual representation of an idea, test it and present the solution (K^6)
0CSHS457_4	**Develop** and test innovative ideas through a rapid iteration cycle (K^6)
0CSHS457_5	**Develop** Professional skills, leadership and teamwork skills, shouldering responsibilities, motivating co-workers/ team members, building strong networks, resolving conflicts (S^3)
0CSHS457_6	**Exhibit** ethical practices in professional work ethics. (A^5)

Course Contents:

Expt. No.	List of Activity	Contact Hours
1	Overview of Design Thinking – What, Why and How? Using a case study	1 Hr
2	Process of Design Thinking Multiple frameworks – TCS 4D, Stanford DT, Cooper Method	1 Hr
3	Discovery - Understanding the problem from users perspective (User Research) - Who are the users?	8 Hrs

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B.Tech-CSE- 31/34

	- Goals, motivations, behaviors, pain areas, opportunities - Activities – planning, questionnaire, context of use, interviews	
4	Introduction to Ideation and Prototyping Strategies Envisioning (Defining and Conceptualizing) Story boarding, Ideation, Brainstorming	4 Hrs
5	Prototype Iteration – 1	2 Hrs
6	Prototype Iteration – 2	2 Hrs
7	Introduction to Design Research Strategies and Synthesis	2 Hrs
	Testing with end users, Refinement	

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Understanding Design Thinking, Lean, and Agile	Jonny Schneider	O'Reilly	-	2017
2.	Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days	Jack Knapp and others	Simon & Schuster	-	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Design for How People Think	John Whalen	O'Reilly	-	2019
2.	Change by Design	Tim Brown	HarperCollins	-	2009
3.	Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School	IdrisMootee	Wiley	-	2013
4	Creative Confidence: Unleashing the Creative Potential Within Us All	Kelley, D. & Kelley, T	New York: William Collins	-	2014
5	The Achievement Habit: Stop Wishing, Start Doing, and Take Command of Your Life	Roth, B	Harper Business	-	2015
6	The Design of Business: Why Design Thinking is the Next Competitive Advantage. Boston	Roger, M	Harvard Business Review Press	-	2013

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B.Tech-CSE - 32/3~

Course Details:

Class	B. Tech, Sem. VIII
Course Code and Course Title	0CSPR458- Industry* or Institute Project
Prerequisite/s	0CSPR457
Teaching Scheme: Lecture/Tutorial/Practical	0/0/20
Credits	20
Evaluation Scheme: ISE/ESE	50/50

Course Objectives:

01	To identify the real world problem and to undergo relevant literature survey.
02	To use latest design, development tools and technologies from computer science and engineering domain
03	To solve the real-world problems using latest design, development tools and technologies.
04	To exercise the project management techniques and team-work.
05	To acquire ability to map technical skills to real life applications through modeling.

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

0CSPR458_1	Identify, formulate and solve a problem. (K3)
0CSPR458_2	Analyze the hardware and/or software requirements of the system (K4)
0CSPR458_3	Use different tools available in the market for design, coding, testing and deployment and documentation (K3)
0CSPR458_4	Design and construct a hardware and/or software system, component, or process to meet desired requirements of the problem undertaken. (K6)
0CSPR458_5	Defend or argue or appraise the results obtained during project work (K5)
0CSPR458_6	Demonstrate the developed project / product and its usage to the customers.(K3)
0CSPR458_7	Develop summarizing, writing, documentation and presentation skills to showcase their ideas in the conferences / journals leading to effective communication. (S3)
0CSPR458_8	Exercise all the managerial (project planning, scheduling) and behavioral skills in a team to accomplish the goals of their project (A3)

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B.Tech- CSE - 33/34

Course Contents:

1. Industry* or Institute Project is the task based work leading to partial or complete solution to a problem identified by industry / institute. This final year project is intended to work on real-world problem solving and hence the students may be allowed to work as interns at various industries or institutes of national importance or the research labs.

2. If the students opt for internships at industry, they will work on the problem statements defined by industry with contribution from internal mentor as well. The students who opt for in-house project will be encouraged to formulate their own ideas to solve the real-world problems in the domain of their interests leading to concrete solution to the problem in the institute premises. OR they can be part of any live ongoing research project in the department. The topics being selected should be from the thrust areas and sub-domains of computer science and engineering. The ideas sponsored by industry to be implemented at institute will also be encouraged. Also, it is advised that the students opting for in-house projects should extend their ideas identified in pre-project phase in semester VII. The promising ideas from the students having potential for startups will be encouraged.

3. Irrespective of Industry sponsored project to be implemented at industry or in-house project, project group will select a project topic with consent from guide and approval from the department and submit the brief document discussing outline of the project with clear objectives. The students are required to undergo literature survey, formulate the problem and propose a methodology to achieve the objectives.

4. Project work should involve analytical, experimental, design or combination of these in the area of Computer Science and Engineering; multi-disciplinary work is also encouraged.

5. Students should maintain a project log book containing weekly progress of the project.

6. The project evaluation committee will evaluate the project throughout the semester. The progress of the project will be monitored and assessed as per the project calendar provided by the department.

7. On completion of the work, students should prepare an article and should submit the same to national / international conference, research symposiums, national / international peer reviewed journals. The students should participate in the project exhibitions / competitions in and outside the institute at state / national level.

8. On completion of the work, a project report should be prepared using Latex and the soft and print copy of the same should be submitted to the department.

9. Students need to undergo all the modes of evaluation scheduled by the department time-to-time.

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B.Tech -CSE -34/34