SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)
(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))
Pedatadepalli, **TADEPALLIGUDEM – 534 101.**W.G.Dist**. (A.P)**
Department of Computer Science & Engineering (Accredited by NBA)

Minutes of the FirstBoard of Studies held on 02/06/2018 at 12:00 PM

Date: 04-06-2018

First meeting of BOS in Computer Science & Engineering department along with external members is held on 2/6/2018 at 12.00 P.M in the James Gosling lab of CSE department.

Minutes of meeting

Item No. 1: Introducing members of BOS.

The HOD extended a formal welcome and introduced the members.

Item No. 2: Presentation of the profile of the department.

The HOD made a brief presentation of the profile of the Department for the information of the External Members.

Item No. 3: Course Structure of U.G. Programme (B.Tech – CSE)

- The Rules & Regulations for B.Tech Programme and the curriculum for 1st Year B.Tech across the branches were discussed in the joint meeting of the Boards of Studies in the Programme. As such, the following course structure for I B.Tech is agreed upon.

Semester	No. of Theory Courses	No. of Lab Courses	No. of credits
I	5 (Including Mandatory Course in English & Environmental Studies)	4	16.5
II	5	3	19.5

- The details of the course structure for the I&II semesters of B.Tech (CSE) are given in **Annexure-I.**

- The Course structure for II, III & IV years of B.Tech (CSE) programme was also presented by the HOD. The board suggested some changes in the proposed structure and accordingly it is modified. The approved course structure is given in **Annexure-II**. The detailed syllabus for these courses will be presented in the next BoS meeting for discussion and approval.

Item No: 4 : Course structure for PG programme (M.Tech – CSE)

- The Course structure for PG programme (M.Tech – CSE) is presented. The board suggested some changes in the proposed structure and accordingly it is modified and deliberated upon. The approved course structure is given in **Annexure – III.**
- The detailed syllabus along with prescribed books is also presented. With a few changes the syllabi for all the courses of I & II Semesters is approved. The approved syllabus for the courses is given in **Annexure –IV.**

Dr.D.JayaKumari
BOS Chairperson

Head of the Department
Dept. of Computer Science & Engineering
Sri Vasavi Engineering College
TADEPALLIGUDEM-534 101

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

PEDATADEPALLI, TADEPALLIGUDEM-534 101

Department of Computer Science & Engineering (Accredited by NBA)

Date: 11/06/2018

COURSE STRUCTURE OF FIRST YEAR B.TECH (CSE)
(For 2018 – 2019 Admitted Batch)

I SEMESTER

S.No	Course Code		Course Name	L	T	P	C
1	V18ENT01		English – I	2	-	-	MNC
2	V18MAT01	BSC	Engineering Mathematics – I	3	1	-	4
3	V18PHT02	BSC	Semiconductor Physics And Opto-Electronic Devices	3	1	-	4
4	V18EET01	ESC	Basic Electrical and Electronics Engineering	3	1	-	4
5	V18CHT02		Environmental Studies	3	-	-	MNC
6	V18ENL01		English Communication Skills Lab – I	-	-	2	MNC
7	V18MEL01	ESC	Engineering & IT Workshop	-	-	3	1.5
8	V18EEL01	ESC	Basic Electrical and Electronics Engineering Lab	-	-	3	1.5
9	V18PHL02	BSC	Semiconductor Physics And Opto-Electronic Devices Lab	-	-	3	1.5
Total				14	3	11	16.5

Total Contact Hours: 28

II SEMESTER

S. No	Course Code		Course Name	L	T	P	C
1	V18ENT02	HSS	English – II	2	-	-	2
2	V18MAT02	BSC	Engineering Mathematics – II	3	1	-	4
3	V18CHT01	BSC	Engineering Chemistry	3	1	-	4
4	V18CST01	ESC	Programming in ‘C’ for problem Solving	3	-	-	3
5	V18MET01	ESC	Engineering Graphics	1	-	3	2.5
6	V18ENL02	HSS	English Communication Skills Lab – II	-	-	2	1
7	V18CSL01	ESC	Programming Lab in ‘C’ for problem Solving	-	-	3	1.5
8	V18CHL01	BSC	Engineering Chemistry Lab	-	-	3	1.5
Total				12	2	11	19.5

Total Contact Hours: 25

V18CST01	Programming in 'C' for problem Solving (Common to all branches)	L	P	C
		3	0	3

Year/Sem: I Year I Sem

Syllabus Details

1. **Course Outcomes:**

CO1: Describe various problem solving strategies such as Algorithms and Flowcharts **(K2)**
CO2: Develop various programming constructs using Control Structures. **(K3)**
CO3: Summarize the process of modular programming approach **(K5)**
CO4: Illustrate the usage of String handling functions and pointers **(K3)**
CO5: Construct Programs using Structures and Unions. **(K3)**
CO6: Distinguish between Sequential files and Random access files. **(K4)**

2. **Co- PO mapping**

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
V18CST01.1	1	1	1	1	1			1				3
V18CST01.2	2	1	1	1	2			2				3
V18CST01.3	3	3	2	2	3			3				3
V18CST01.4	2	1	1	1	2			2				3
V18CST01.5	2	1	1	1	2			2				3
V18CST01.6	3	2	1	1	1			3				3
V18CST01	2.16	1.5	1.16	1.16	1.83			2.16				3

CO-PSO Mapping

Course Outcome	PSO1	PSO2
V18CST01.1	1	-
V18CST01.2	2	-
V18CST01.3	3	-
V18CST01.4	2	-
V18CST01.5	2	-
V18CST01.6	3	-
V18CST01	2.16	-

3. Syllabus

UNIT-I:Problem solving concepts: Problem solving strategies – Top down design, Bottom up design, Algorithms, Flow-charts, Types of Programming Languages, Compiler, Assembler and Linker, Testing and Debugging a program. **Introduction to C Programming:** Overview and importance of C, C Program Structure, Creation and Compilation of C Programs, Identifiers, Variables, Data types, Constants, Declarations.

UNIT-II: Operators: Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, bitwise operators, special operators, expressions, Precedence, Associativity, Order of evaluation, Type conversion, Programming Examples.**Input and output statements:** Input and output functions.
Flow of Control: Conditional statements - If-else, Switch-case constructs, Loops - while, do-while, for.

UNIT-III: Arrays: Single-Dimensional Arrays, multi-Dimensional Arrays, initialization and accessing individual elements. **Functions:** Top down approach of problem solving, standard library functions, user defined functions, parameter passing - call by value, call by reference, return statement, passing arrays as parameters to functions, recursion, command line arguments.

UNIT-IV: Storage Classes: Scope and extent, Storage Classes in a single source file: auto, extern and static, register. **Strings in C**- Concepts, string handling functions. **Understanding pointers:** Accessing the address of a variable, declaring pointer variables, initialization of pointer variables, accessing a variable through its pointer, pointer arithmetic, pointer and arrays, pointers and character strings, array of pointers.

UNIT-V:Structures and Unions: Defining, declaring, initialization, accessing, comparing, operations on individual members, array of structures, structures within structures, self referential structure, structures and functions, pointers and structures, bit fields, Programming Examples.
Dynamic Memory Allocation: Definition, malloc, calloc, realloc, free, dynamic arrays.

UNIT-VI:File Processing: Defining and Opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access to files, Programming Examples.
Preprocessor: Definition, Macro substitution, file inclusion, compiler control directives, Programming Examples.

4. Text Books:

1. Computer Programming: Ashok N Kamthane, Pearson Education
2. C: The Complete Reference: Herbert Schildt, Osborne/Mcgraw Hill, Inc.
3. Let Us C, Yashavant Kanetkar, BPB Publications, 15th Edition

Reference Books:

1. Programming with C, Second edition, Byron S Gottfried, Tata McGrawhill
2. Programming in C, Reema Thareja, Oxford.
3. Problem Solving and Programm design in C, Hanly J R & Koffman E.B, Pearson Education, 2009.
4. Foundations of Computer Science (C Edition) , Alfred V. Aho.
5. Programming and Problem Solving Using C, ISRD Group, Tata McGraw Hill, 2008.
6. Programming in C, Pradip Dey, Manas Ghosh, Oxford University Press, 2007.
7. Problem Solving Using C: Structured Programming Techniques, Yuksel Uckan.
8. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
9. Computer Programming in C – Kerninghan & Ritchie, PHI

V18CSL01	Programming Lab in 'C' for problem Solving (Common to all branches)	L	P	C
		0	3	1.5

Year/Sem: I Year I Sem

Syllabus Details

1. Course Outcomes:

CO 1: Demonstrate problem solving techniques using Control Structures. **(K3)**

CO 2: Construct Programmes using the concepts of Arrays, Strings and Pointers. **(K3)**

CO3: Apply the concepts of Functions, Structures and Unions. **(K3)**

CO4: Use various file processing operations to develop realtime applications. **(K4)**

2. CO- PO mapping

Course Outcome	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
V18CSL01.1	2	1	1	1	2			2				3
V18CSL01.2	2	1	1	1	2			2				3
V18CSL01.3	2	1	1	1	2			2				3
V18CSL01.4	3	2	1	1	3			3				3
V18CSL01	2.25	1.25	1	1	2.25			2.25				3

CO-PSO Mapping

Course Outcome	PSO1	PSO2
V18CSL01.1	2	-
V18CSL01.2	2	-
V18CSL01.3	2	-
V18CSL01.4	3	-
V18CSL01	2.25	-

3. Syllabus

LIST OF EXPERIMENTS:

Tutorial 1: Problem solving using computers.
Lab1: Familiarization with programming environment.

Tutorial 2: Variable types and type conversions.
Lab 2: Simple computational problems using arithmetic expressions.

Tutorial 3: Branching and logical expressions.
Lab 3: Problems involving if-then-else structures, switch – case.

Tutorial 4: Loops, while and for loops.
Lab 4: Iterative problems e.g. sum of series.

Tutorial 5: 1D Arrays: searching, sorting.
Lab 5: 1D Array manipulation.

Tutorial 6: 2D arrays.
Lab 6: Matrix problems.

Tutorial 7: Functions, call by value, call by reference, command line arguments.
Lab 7: Simple functions.

Tutorial 8: String handling.
Lab 8: String handling functions.

Tutorial 9: Pointers.
Lab 9: Programming with pointers.

Tutorial 10: Recursion, structure of recursive calls.
Lab 10: Recursive functions.

Tutorial 11: Structures, unions and dynamic memory allocation.
Lab 11: Structures & unions.

Tutorial 12: File handling.
Lab 12: File operations.

4. Reference Books:

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
2. Computer Programming in C, V. Rajaraman, PHI.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. C- The Complete Reference, Herbert Schildt, Osborne/Mcgraw Hill, Inc.
5. Programming with C, Byron S Gottfried, Second edition, Tata McGrawhill.
6. Programming in C, Reema Thareja, Oxford.
7. Problem Solving and Program design in C, Hanly J R & Koffman E.B, Pearson Education, 2009.
8. Programming and Problem Solving Using C, ISRD Group, Tata McGraw Hill,2008.

V18MEL01	IT WORKSHOP LAB	L	P	C
		0	3	1.5

1. Course Outcomes:
After successful completion of the course, the student will be able to

- Demonstrate Disassemble and Assemble a Personal Computer and its peripherals(K3)
- Practice installation of operating system.(K3)
- Connect peripherals and install required drivers(K4)
- Demonstrate internet connectivity and usage of internet as per his/her requirement.(K3)
- Prepare the Documents for their projects(K3)
- Prepare Slide shows for their presentations (K3)

2. **CO- PO mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													2
CO2	2	1												2
CO3	3	2												2
CO4	2	1				2		2		3		3		2
CO5	2	1	1		2			2				3		
CO6	2	1	1		2			2				3		

3. **Syllabus**

PC Hardware:

Task 1: Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

Task 2(Optional) :A practice on disassembling the components of a PC and assembling them to back to working condition.

Task 3: Examples of Operating systems- DOS, Installation of MS windows on a PC.

Task 4: Introduction to Memory, types of Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters.

Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues.

Task 5: Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

Internet & Networking Infrastructure

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices-Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL,ISP.

Task 7: Search Engines & Netiquette: Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

Word

Task 8: MS Word Orientation: Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving, , mail merge.

Task 9: Creating project : Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Excel

Task 10: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations. **Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text, ,Charts,

Task 11: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

Power Point

Task 12: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables, animation and Charts in PowerPoint.

TEXT BOOK: Faculty to consolidate the workshop manuals using the following references

1. Computer Fundamentals, Anita Goel, Pearson.
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008.
3. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.
4. Comdex Information Technology , Vikas Gupta, dreamtech.

REFERENCE BOOK:

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu.
2. PC Hardware trouble shooting made easy, TMH.

Date: 11/06/2018

II B.TECH

S.No.	III - Semester						
	Course Code		Course	L	T	P	C
1	V18MAT04	BSC	Probability & Statistics	3	1	0	4
2	V18ECT06	ESC	Digital Electronics	3	0	0	3
3	V18CST02	PCC	Data Structures and Algorithms	3	0	0	3
4	V18CST03	ESC	Discrete Mathematics	3	0	0	3
5	V18CST04	ESC	Object Oriented Programming for problem Solving	3	0	0	3
6	V18ECL04	ESC	Digital Electronics Lab	0	0	2	1
7	V18CSL02	PCC	Data Structures and Algorithms Lab	0	0	3	1.5
8	V18CSL03	ESC	Object Oriented Programming for problem Solving Lab	0	0	3	1.5
9	V18ENT03		Employability Skills (Soft Skills, Technical Training) -I	7	0	0	MNC
Total				**22**	**1**	**8**	**20**

Total Contact Hours: 31

IV - Semester							
S.No	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST05	PCC	Computer Organization	3	0	0	3
2	V18CST06	PCC	Software Engineering	3	0	0	3
3	V18CST07	PCC	Formal Languages and Automata Theory	3	0	0	3
4	V18CST08	PCC	Java Programming	3	0	0	3
	V18CST09	PCC	Python Programming	3	0	0	3
5	V18MBET51	HSS	Managerial Economics and Financial Accountancy	3	0	0	3
6	V18CSL04	PCC	Java Programming Lab	0	0	3	1.5
7	V18CSL05	PCC	Python Programming Lab	0	0	3	1.5
8			Constitution of India/Essence of Indian Traditional Language	2	0	0	MNC
9	V18ENT04		Employability Skills (Engineering Communication Skills, Technical Training) -II	7	0	0	MNC
Total				**27**	**0**	**6**	**21**

Total Contact Hours: 32

III B.TECH

V - Semester							
S.No	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST10	PCC	Data Base Management Systems	3	0	0	3
2	V18CST11	PCC	Computer Networks	3	0	0	3
3	V18CST12	PCC	Operating Systems	3	0	0	3
4	V18CST13	PCC	Design and Analysis of Algorithms	3	0	0	3
5	**Elective – I**						
	V18CST14	PEC	1. Statistics with R Programming	3	0	0	3
	V18CST14		2. Data Communication				
	V18CST14		3. Advanced Data Structures				
	V18CST14		4. Graph Theory				
6	**Elective – II**						
	V18CST14	PEC	1. Scripting Languages	3	0	0	3
	V18CST14		2. Data Science				
	V18CST14		3. Principles of Programming Languages				
	V18CST14		4. Computer Graphics				
7	V18MBET53	HSS	Organizational Behavior	3	0	0	3
8	V18CSL06	PCC	Database Management Systems Lab	0	0	3	1.5
9	V18CSL07	PCC	Operating Systems and CN Lab	0	0	3	1.5
10	V18ENT05		Employability Skills (Aptitude, English and Technical Training) -III	8	0	0	MNC
Total				**27**	**0**	**8**	**24**

Total Contact Hours: 36

VI - Semester							
S.No	**Course Code**		**Course**	**L**	**T**	**P**	**C**
1	V18CST15	PCC	Compiler Design	3	0	0	3
2	V18CST16	PCC	Advanced Java and Web Technologies	3	0	0	3
3	V18CST17	PCC	Object Oriented Analysis and Design through UML	3	0	0	3
4		PCC	Cryptography & Network Security	3	0	0	3
5	**Elective - III**						
	V18CST18	PEC	1. Unix and Kernel Programming	3	0	0	3
	V18CST19		2. Advanced Data Bases				
	V18CST20		3. Mobile Computing				
	V18CST21		4. Software Testing Methodologies				
6	**Open Elective – I (from other depts)**	**OEC**	**(V18CST22- V18CST25)**	3	0	0	3
7	V18CSL09	PCC	Object Oriented Analysis and Design through UML Lab	0	0	3	1.5
8	V18CSL10	PCC	Advanced Java and Web Technologies Lab	0	0	3	1.5
9	V18CSL11	**Project / Seminar /CV**	Seminar	0	0	4	2
10	V18ENT06		Employability Skills (Aptitude, English and Technical Training) -IV	18	0	0	MNC
			Total	**23**	**0**	**10**	**23**

Total Contact Hours: 33

IV B.TECH

S.No.	Course Code		Course	L	T	P	C
	VII - Semester						
1	V18CST26	PCC	Big Data Analytics	3	0	0	3
2	V18MBET52	HSS	Management Science	3	0	0	3
3	**Elective – IV**						
	V18CST27	PEC	1. Design Patterns	3	0	0	3
	V18CST28		2. Ethical Hacking				
	V18CST29		3. Advanced Computer Architecture				
	V18CST30		4 Image Processing				
4	**Open Elective – II (from other depts)**	**OEC**	**(V18CST31- V18CST34)**	3	0	0	3
5	**Open Elective – III (Offered by Dept.)**						
	V18CST35	**OEC**	1. Data warehousing & Mining	3	0	0	3
	V18CST36		2. Artificial Intelligence				
	V18CST37		3. Game Theory				
6	V18CSL12	PCC	Big Data Analytics Lab	0	0	2	1
7	V18CSL13	**Project / Seminar / CV**	Project Work (Part-A)	0	0	4	2
Total				**15**	**0**	**06**	**18**

Total Contact Hours: 21

S.No	Course Code		Course	L	T	P	C
	VIII - Semester						
1	**Elective – V**						
	V18CST38	PEC	1. Machine Learning	3	0	0	3
	V18CST39		2.High Performance Computing				
	V18CST40		3.Software Project Management				
	V18CST41		4.Security and Privacy				
2	**Elective – VI**			3	0	0	3
	V18CST42	PEC	1. Internet of Things				
	V18CST43		2. Computer Vision				
	V18CST44		3. Natural Language Processing				
	V18CST45		4. BioInformatics				
3	**Open Elective- IV (Offered by Dept.)**						
	V18CST46	OE	**1.** Cloud Computing	3	0	0	3
	V18CST47		**2.** Adhoc and Sensor Networks				
	V18CST48		**3.** Soft Computing				
4	V18CSL14	**Project / Seminar / CV**	Project Work (Part-B)	0	0	12	6
5	V18CSL15	**Project / Seminar / CV**	Comprehensive Viva	0	0	0	3
Total				**9**	**0**	**12**	**18**

Total Contact Hours: 21

The following are the list of Open Elective Courses offered by our Department:

OEC			
Year	SEM	Course	Credits
III Yr	**Open Elective - I**		
	II SEM	1. Introduction to Python programming 2. Fundamentals of Data Structures 3. Linux basics and Programming 4. Artificial Intelligence	3
IV Yr	**Open Elective - II**		
	I SEM	1. Object Oriented Programming using Java 2. Relational Database Management System 3. Principles of Software Engineering 4. Web application design and Programming	3
Total			**06**

Category	**Abbreviations**	**Required credits as per AICTE**	**Credits assigned**
HSS	**HSS:** Humanities and Social Sciences Including Management	12	12(8%)
BSC	**BSC:** Basic Science Courses	24	23(14%)
ESC	**ESC:** Engineering Science Courses	29	25.5(16%)
PCC	**PCC:** Professional Core Courses	49	56.5(35%)
PEC	**PEC:** Professional Elective Course	18	18(11%)
OEC	**OEC:** Open Elective Course	12	12(8%)
Project & Seminar	**MC :** Mandatory Course	15	13(8%)
Total		159	160

M.Tech CSE Programme Course Structure

(With effect from **2018-19** Admitted Batch onwards**)**

I-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CST81	Object Oriented Software Engineering	3	-	-	3
2	V18CST82	NOSQL Database	3	-	-	3
3	V18CST83	Advanced Computer Architecture	3	-	-	3
4	V18CST84	Advanced Operating Systems	3	-	-	3
5	V18CST85	Advanced Data Structures and Algorithm Analysis	3	-	-	3
6	V18CST86	Machine Leaning	3	-	-	3
8	V18CST87	MOOCS	-	-	-	MNC
9	V18CSL31	NOSQL Database Lab	-	-	2	1
10	V18CSL32	Advanced Data Structures and Algorithm Analysis Lab	-	-	2	1
11	V18CSL33	Seminar-I	-	-	-	2
Total			**18**	**-**	**4**	**22**

Total Contact Hours=22

II-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CST88	Data Science	3	-	-	3
2	V18CST89	Advanced Web Technologies	3	-	-	3
3	V18CST90	Cloud Computing	3	-	-	3
4	V18CST91	Internet of Things	3	-	-	3
5	**Elective-I**		3	-	-	3
	V18CST92	1) Cyber Security				
	V18CST93	2) Artificial Intelligence				
	V18CST94	3) Bioinformatics				
	V18CST95	4) Wireless Sensor Networks				
6	**Elective-II**		3	-	-	3
	V18CST96	1) Image Processing				
	V18CST97	2) Parallel Algorithms				
	V18CST98	3) Mobile Computing				
	V18CST99	4) Grid Computing				
7	V18CSL34	Data Science Lab	-	-	2	1
8	V18CSL35	Advanced Web Technologies Lab	-	-	2	1
9	V18CSL36	Seminar-II	-	-	-	2
	Total		**18**	**-**	**4**	**22**

Total Contact Hours=22

M.Tech CSE Programme Course Structure

(With effect from **2018-19** Admitted Batch onwards**)**

III-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CSL37	Comprehensive Viva Voce	-	-	-	2
2	V18CSL38	Project Work (Part-A)	-	-	-	8
	Total		-	-	-	10

IV-SEMESTER

S.No.	Course Code	Course	L	T	P	C
1	V18CSL39	Project Work (Part – B)	-	-	-	16
	Total		-	-	-	16

Total Credits (for all sems) = 70

I Year I Semester	L	P	C
	3	0	3

OBJECT ORIENTED SOFTWARE ENGINEERING

Course Outcomes:
After completion of this course the students will be able to:

1. Describe Software development life cycle for Object-Oriented solutions of Real-world problems.
2. Discuss Planning, Estimation and CASE tools.
3. Apply OO concepts along with their applicability contexts.
4. Demonstrate object oriented analysis and design.
5. Describe Implementation, Integration and Maintenance phases.

UNIT I: Introduction to Classical software Engineering: Historical, Economic and Maintenance aspects. Introduction to OO Paradigm. Different phases in structured paradigm and OO Paradigm. Software Process and different life cycle models and corresponding strengths and weaknesses.

UNIT II: Planning and Estimation: Estimation of Duration and Cost, COCOMO components of software. Project Management plan. Planning Object-Oriented Projects.**Tools for step wised refinement:** Cost - Benefit analysis, Introduction to software metrics and CASE tools. Taxonomy and scope of CASE tools.

UNIT III: Modules to objects: Cohesion and Coupling, Data Encapsulation and Information hiding aspects of Objects. Inheritance, Polymorphism and Dynamic Binding aspects. Cohesion and coupling of objects. Reusability, Portability and Interoperability aspects.
Introduction to testing, with focus on Utility, Reliability, Robustness, Performance, Correctness.

UNIT IV: Requirement phase: Rapid Prototyping method, Specification phase, Specification Document, Formal methods of developing specification document, Examples of other semi - formal methods of using Finite-State- Machines, Petri nets and E- Language.
Analysis phase: Use case Modeling, Class Modeling, Dynamic Modeling, Testing during OO Analysis.

UNIT V: Design phase: Data oriented design, Object Oriented design, and Formal techniques for detailed design. Challenges in design phase.**IIM Phases:** Implementation, Integration and maintenance phases, OOSE aspects in these phases.

TEXT BOOKS:
1. Object oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH
2. Object oriented and classical software Engineering, Timothy Lethbridge, Robert Laganiere, TMH

REFERENCE BOOKS:
1. Component-based software engineering: 7th international symposium, CBSE 2004, Ivica Crnkovic, Springer.

I Year I Semester	L	P	C
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NOSQL Database

Course Outcomes:

- After successful completion of the course students should be able to:
- Define, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column oriented and Graph).
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data
- Performance tune Column-oriented NoSQL databases.
- Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases.

UNIT I: Introduction: Overview and History of NoSQL Databases Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points, Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases.

UNIT II: Replication and sharding, MapReduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

UNIT III: NoSQL Key/Value databases using MongoDB, Document Databases, What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT IV: Column- oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use

UNIT V: NoSQL Key/Value databases using Riak, Key-Value Databases, What Is a Key-Value Store, KeyValue Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Graph NoSQL databases using Neo4,NoSQL database development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use

TEXT BOOKS:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Author: Sadalage, P. & Fowler, Publication: Pearson Education.
2. The Definitive Guide to MongoDB: A complete guide to dealing with Big Data using MongoDB,Eelco Plegge,David Hows, Peter Membrey, Tim Hawkins, Apress Publishers

REFERENCE BOOKS:

1. Redmond, E. &Wilson Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition: 1st Edition.

I Year I Semester	L	P	C
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ADVANCED COMPUTER ARCHITECTURE

Course Outcomes

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

1. Identify different types of parallel computer models
2. Describe various processor and memory organizations.
3. Explain Pipelining, Multiprocessors and Multicomputers concepts.
4. Explain Multivector, SIMD Computers and Multithreaded, Dataflow Architectures.
5. Illustrate the parallel programming models and instruction level parallelism.

UNIT – I: Parallel computer models: The state of computing, Multiprocessors and Multicomputers, Multivector and SIMD computers. **Program and network properties:** Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms.

UNIT – II: Processors: Advanced Processor Technology, Superscalar Processors and Vector Processors. **Memory Hierarchy, Cache and Shared Memory:** Memory Hierarchy Technology, Virtual Memory Technology, Cache Memory Organizations, Shared-Memory Organizations.

UNIT – III: Pipelining: Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design.**Multiprocessors and Multicomputers:** Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message Passing Mechanisms.

UNIT – IV: Multivector and SIMD Computers: Vector Processing Principles, Compound Vector Processing.**Scalable, Multithreaded, Dataflow Architectures:** Latency-Hiding Techniques, Principles of Multithreading.

UNIT – V: Parallel Models, Languages: Parallel Programming Models, Parallel Languages and Compilers.**Instruction Level Parallelism:** Problem Definition, Model of a Typical Processor, Compiler- detected Instruction Level Parallelism, Operand Forwarding, Reorder Buffer, Register Renaming, Tomasulo's Algorithm, Branch Prediction.

TEXT BOOKS:

Advanced Computer Architecture: Parallelism, Scalability, Programmability, Kai Hwang, Naresh Jotwani, Second Edition, Tata McGraw Hill Education

REFERENCE BOOKS:

1. Computer Organization and Design, David A. Patterson and John. L. Hennessy, Fifth Edition, Morgan Kaufmann Series.
2. Computer Architecture and Organization, John P. Hayes, Third Edition, McGraw Hill Education.
3. Computer Architecture and Organization: Design Principles and Applications, B. Govindarajulu, Second Edition, McGraw Hill Education.

I Year I Semester	L	P	C
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ADVANCED OPERATING SYSTEMS

Course Outcomes:

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

- Define, Explain, and Apply Distributed Operating System Concepts: Architectures of Distributed Systems, Distributed Mutual Exclusion, Issues and its Inherent Limitations.
- Describe the concepts of Distributed Resource Management, Dead lock Detection and Resolution
- Explain the concepts of Distributed Shared Memory, Distributed Scheduling, Failure Recovery and Fault tolerance
- Describe the concepts of Cryptography and Data Security in Distributed System
- Describe Multiprocessor Operating System and Database Operating System: Concepts, Architecture and Design issues

UNIT - I:Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations – inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms – a comparative performance analysis.

UNIT-II: Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT-III: Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm – performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing –task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT-IV: Protection and security -preliminaries, the access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard public key cryptography - multiple encryption - authentication in distributed systems.

UNIT-V: Multiprocessor Operating Systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control algorithms - introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

TEXT BOOKS:

1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001

REFERENCE BOOKS:

1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003.

I Year I Semester	L	P	C
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ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

Course Outcomes:

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

- Build Linear data structures using static and dynamic memory allocation.
- Construct different types of trees.
- Implement different types of graph algorithms.
- Analyze algorithms and to determine correctness and time efficiency of algorithm.
- Implement dynamic programming for different types of problems.

UNIT – I: Performance analysis, asymptotic notation, performance measurement. Linear Data Structures-Abstract Data Types, Linked list - Single, double and Circular linked list, Skip list. Stacks and Queues implement using Array representation and Linked list representation, Circular Queues, applications of stacks and queues.

UNIT – II: Trees – Introduction to trees, Binary tree, Threaded Binary tree, Binary Search Tree, AVL Trees, Red Black Trees, Splay tree. Multi way trees: B- Trees , B^* Tress, B^+ Trees , prefix B^+ Tress, 2-4 trees, tree traversal techniques, tries.

UNIT – III: Graphs – Introduction to Graphs, Graph representation(array and linked list), Graph traversing algorithms, complexity analysis of BFS and DFS, Spanning trees, Shortest path calculation, topological sort and graph applications.

UNIT – IV: Algorithm analysis – Introduction, Greedy Method and its applications (I/o Knapsack Problem and topological sort). Divide and conquer and its applications (Merge sort and quick sort).

UNIT – V: Dynamic programming and its applications (I/o Knapsack problem and all pairs shortest path), Back Tracking and its applications (I/o Knapsack problem, travelling sales person). Branch and bound and its applications (I/o Knapsack problem, travelling sales person).

TEXT BOOKS:

1. "Data Structures, Algorithms and Applications in C++ ", Sartaj Sahni, University Press Second Edition.
2. "Data Structures and algorithms in JAVA", Adam Drozdek, Thomson Course Technology, Indian edition, second edition.

REFERENCE BOOKS:

1. Data Structures, A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.
2. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson
3. Classic Data Structures, 2/e, Debasis, Samanta, PHI,2009.

I Year I Semester	L	P	C
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MACHINE LEARNING

Course Outcomes:
After successful completion of this course, the student will be able to:

- Recognize the characteristics of machine learning that make it useful to real-world Problems.
- Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
- Have heard of a few machine learning toolboxes.
- Be able to use support vector machines.
- Be able to use regularized regression algorithms.

UNIT - I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. Binary classification and related tasks: Classification, Scoring and ranking, Class probability estimation.

UNIT-II: Beyond binary Classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning:** The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts.

UNIT-III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT-IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT-V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. UnderstandingMachine Learning: From Theory toAlgorithms, Shai Shalev-Shwartz, ShaiBenDavid, Cambridge. 2. Machine Learning in Action, Peter Harington, 2012, Cengage.

I Year I Semester	L	P	C
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ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS LAB

Course Outcomes:

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

- Design and analyze simple linear and non linear data structures
- Implement ADT for Data Structures
- Implement algorithms using different types of technique.
- Strengthen the ability to identify and apply the suitable data structure for the given real world problem

List of Experiments

Implement the following list of experiments using C++:

1. Write a program to implement single linked list, double linked list and circular linked list using ADT.
2. Implement stack and queue using ADT.
3. Implementation of Multitask in a Single Array
4. Implement evolution of expression
5. Implement AVL Trees operations and display the tree elements using any one non recursive traversing technique.
6. Construct a graph and implement BFS and DFS graph traversal techniques.
7. Construct a graph and implement Prims and Krushkals minimum spanning trees.
8. Implement single source and all pair shortest path algorithms.
9. Implement Merge sort and quick sort using divide and conquer technique
10. Implement I/o Knapsack Problem using greedy technique
11. Implement travelling sales person problem using back tracking.
12. Implement any algorithm using Branch and Bound technique.

I Year I Semester	L	P	C
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NOSQL Laboratory

Course Outcomes

After successful completion of the course students should be able to:

1. Install and run MongoDb
2. Identify differences between relational and NoSQL database systems
3. Execute various operations in Mongo DB
4. Apply Mapreduce for problem solving
5. Know Column oriented databases

LIST OF EXPERIMENTS

1. Introduction to MongoDB and its Installation on Windows & Linux

2. Description of mongo Shell, Create database and show database

3. Commands for MongoDB and To study operations in MongoDB – Insert, Query, Update, Delete and Projection

4. Where Clause equivalent in MongoDB

5. To study operations in MongoDB – AND in MongoDB, OR in MongoDB, Limit Records and Sort Records. To study operations in MongoDB – Indexing, Advanced Indexing, Aggregation and Map Reduce.

6. Practice with ' macdonalds ' collection data for document oriented database. Import restaurants collection and apply some queries to get specified output.

7.Simple Querying using simple select(row and column) and Hive functions

8. Advanced querying using table joins, sampling in hive and subqueries

9. Define an external Hive table and review the results

10. Column oriented databases study, queries and practices

I Year II Semester	L	P	C
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DATA SCIENCE

Course Outcomes:

- After completion of this course, student will be able to:
- Understand the process of data validation and its role in decision making
- Understand, create, and modify analytic and exploratory algorithms operating over data. Verify and quantify the validity of hypothesis using data analytics.
- Know the privacy and data protection legislation and the data scientist professional code and ethics.

UNIT-1: Introduction: What is Data Science? What roles exist in Data Science? Current landscape of perspectives. Define the workflow, tools and approaches data scientists use to analyze data. Define a problem and identify appropriate data sets using the data science workflow. Walkthrough the data science workflow using a case study.

UNIT-II: Statistics Fundamentals: Exploratory Data Analysis and the Data Science Process-analyze datasets using basic summary statistics: mean, median, mode, max, min, quartile, inter-quartile, range, variance, standard deviation and correlation.

UNIT-III: Data Visualization – scatter plots, scatter matrix, line graph, box blots, and histograms. Identify a normal distribution within a dataset using summary statistics and visualization. Causation vs. Correlation. Test a hypothesis within a sample case study. Validate your findings using statistical analysis.

UNIT-IV: Foundations of Data Modeling: Introduction Regression – data modelling and linear regression. Categorical variables versus Continuous variables. Build the linear regression/logistic regression model using a dataset. Fit model – regularization, bias and error metrics. Evaluate model fit using loss functions – MSE (Mean Square Error), RMSE (Root MSE), Mean Absolute Error(MAE). Apply different regression models based on fit and complexity. Evaluate model using metrics such as accuracy/error, Confusion matrix, ROC curve and Cross Validation.

UNIT-V:Dimensionality Reduction – perform dimensionality reduction using topic models such as PCA and SVD. Refine and extract data/information from sample datasets. Introduction to Classification - define classification model, apply k-NN, Naïve Classifier and Decision trees. Build the classification model using a dataset and evaluate.

TEXT BOOKS:

1. The Art of Data Science: A Guide for Anyone Who Works with Data, Roger D. Peng, Elizabeth Matsui, Lean Pub, 2015.
2. Doing Data Science, Straight Talk from The Frontline, Cathy O'Neil and Rachel Schutt. O'Reilly. 2014.
3. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking, Foster Provost and Tom Fawcett. 2013
4. Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2009.

REFERENCE BOOKS:

1. Mining of Massive Datasets, JureLeskovek, AnandRajaraman and Jeffrey Ullman. Cambridge University Press. 2014.
2. Machine Learning: A Probabilistic Perspective.Kevin P. Murphy, MIT Press, 2013.
3. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.
4. Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr., Cambridge University Press. 2014.
5. R Programming for Data Science, Roger D. Peng, LeanPub, 2015.
6. Python for Data Science for Dummies, Luca Massaron and John Paul Mueller, John Wiley and Sons, 2015.

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Advanced Web Technologies

Course Outcomes:
After completion of the course, the student will be able to:

1. Understand the current technologies in Internet world
2. Design interactive web pages using HTML & Style Sheets and design Individual Graphical User Interfaces
3. Acquire knowledge of XML fundamentals and usage of XML technology in electronic data Interchange and creation of desktop applications using swings and beans.
4. Know the fundamentals of client side scripting such as JavaScript and apply it for data validation.
5. Design and develop web based enterprise systems for the enterprises using technologies like JSP with database.
6. Implement client side programming using java script, CSS
7. Learn and implement advanced and current technologies like AJAX, JQuery, PHP, Servlets, and JSP
8. Learn to implement web services

UNIT-I
HTML & CSS: Introduction - Elements, Tags, Attributes, Heading, Paragraph. Formatting, Link, Image, Table, List, Block, Form, Frame Layout, DHTML, Basic Web Page Development, CSS- Create Class Styles, Create ID Styles ,Span, Colors.HTML5 in brief.
JavaScript : Introduction - JavaScript in Web Pages, The Advantages of JavaScript Writing JavaScript into HTML; Building Up JavaScript Syntax; Basic Programming Techniques; Operators and Expressions in JavaScript; JavaScript Programming Constructs; Conditional Checking Functions in JavaScript, Dialog Boxes, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array. Function, Errors, Validation. The JavaScript Document Object Model- Introduction (Instance, Hierarchy); The JavaScript Assisted Style Sheets DOM; Understanding Objects in HTML (Properties of HTML objects, Methods of HTML objects); Browser Objects, Handling Events Using JavaScript

UNIT-II
Extensible Markup Language (XML):- Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation, Tree, Syntax, Elements, Attributes, Validation, and Viewing. XHTML in brief
Installing and Configuring MySQL:- Current and Future Versions of MySQl , How to Get MySQL, Installing MySQL on Windows, Trouble Shooting your Installation, Basic Security Guidelines

UNIT-III
Advanced Dynamic Web Client Side Programming: AJAX-xml Http Request object-AJAX applications-AJAX frame work -java script libraries - JQuery-basics – event handling, DOM,AJAX-effects- jQuery UI Web design Frameworks: Responsive web design-overview on Twitter bootstrap-DoJo- YahooUI-Google web toolkit libraries-Applets-overview on javaFX applets

UNIT-IV
Server Side Programming with PHP: The Building blocks of PHP, Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output.
Functions: What is function? Calling functions, Defining Functions. Variable Scope, more about arguments working with Arrays and Some Array-Related Functions.
Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP
Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, and Working with File Uploads.

Learning basic SQL Commands: Learning the MySQL Data types, Learning the Table Creation Syntax, Using Insert Command, Using SELECT Command, Using WHERE in your Queries, Selecting from Multiple Tables, Using the UPDATE command to modify records, Using the DELETE Command, Frequently used string functions in MySQL, Using Date and Time Functions in MySQL.
Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data.

UNIT-V
Server Side Programming With Servlets and JSP: Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues, Introduction to JSP: The Anatomy of a JSP Page. JSP Application Design with MVC , JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing Sharing Session and Application Data Memory Usage Considerations

TEXT BOOKS:

1. "*Java server programming java JavaEE5 Black Book*", Kogent Solutions Dreamtech Press, Inc, ISBN-13 9788177228359 ISBN-10 8177228358, 2008.
2. "*AJAX black book*", new edition, Kogent Solutions Inc, Dreamtech Press, ISBN:10-81-7722- 838-2 ISBN:13-978-81-7722-838-063. Jonathan Chaffer, Karl Swedberg, "*Learning jQuery*", 3rd Edition , , ISBN 13: 9781849516549, 2011
3. Chris Bates,*Web Programming- building internet applications*, 2nd edition, WILEY Dreamtech, 2006
4. Patrick Naughton and Herbert Schildt, The *complete Reference Java seventhEdition*,TMH, 2007
5. Hans Bergsten, Java *Server Pages*, SPD O'Reilly, 2000
6. Robert W.Sebesta,*Programming world wide web*,Pearson Education,4th edition,2010
7. Marty Hall and Larry Brown,*Servlets And Java Server Pages Volume 1: CORE Technologies*,Pearson,2003.
8. Patrick Naughton and Herbert Schildt, The *complete Reference Java2fifth Edition*, TMH,1999.
9. "Internet and world wide web – How to Program", Deitel & Deitel, Goldberg, Pearson Education
10. "Using HTML 4, XML and JAVA", Eric Ladd, Jim O' Donnel, Prentice Hall of India

REFERENCE BOOKS:

1. Professional Java Server Programming,S.Allamaraju and othersApress (dreamtech).
2. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
3. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
4. Beginning Web Programming-Jon Duckett WROX.
5. Java Server Pages, Pekowsky, Pearson.
6. Java Script,D.Flanagan,O'Reilly,SPD.

I Year II Semester	L	P	C
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CLOUD COMPUTING

Course Outcomes are:
After completion of the course the student will be able to

1. Able to understand about Cloud Computing Platforms and Technologies.
2. Students will be aware about Architecture and Open Challenges in Cloud Computing.
3. Students will be able to monitor and manage cloud computing applications.
4. Students will be able to describe the mechanisms needed to harness Cloud Computing in their own respective endeavors.
5. Students will be able to solve case studies related to Cloud Computing.

UNIT-I
Overview of Computing Paradigm: Recent trends in Computing Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Evolution of cloud computing Business driver for adopting cloud computing
Introduction to Cloud Computing Cloud Computing (NIST Model) Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers Properties, Characteristics &Disadvantages Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing Role of Open Standards

UNIT-II
Cloud Computing Architecture Cloud computing stack Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services Service Models (XaaS) Infrastructure as a Service(IaaS) , Platform as a Service(PaaS), Software as a Service(SaaS) Deployment Models Public cloud, Private cloud, Hybrid cloud, Community cloud.

UNIT-III
Infrastructure as a Service(IaaS) Introduction to IaaS IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM) Resource Virtualization Server, Storage, Network Virtual Machine (resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service) Examples Amazon EC2 Renting, EC2 Compute Unit, Platform and Storage, pricing, customers Eucalyptus
Platform as a Service(PaaS) Introduction to PaaS What is PaaS, Service Oriented Architecture (SOA) Cloud Platform and Management Computation Storage Examples Google App Engine Microsoft Azure
Software as a Service (PaaS) Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS

UNIT-IV
Service Management in Cloud Computing Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously Managing Data Looking at Data, Scalability & Cloud Services Database & Data Stores in Cloud Large Scale Data Processing

UNIT-V
Cloud Security Infrastructure Security Network level security, Host level security, Application level security Data security and Storage Data privacy and security Issues, Jurisdictional issues raised by Data location Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

TEXT BOOKS:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010
5. Gautam Shroff, "*Enterprise Cloud Computing Technology Architecture Applications"*, Cambridge University Press; 1 edition, [ISBN: 978-0521137355], 2010.
6. Toby Velte, Anthony Velte, Robert Elsenpeter, "*Cloud Computing, A Practical Approach"* McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.
7. Dimitris N. Chorafas, "*Cloud Computing Strategies"* CRC Press; 1 edition [ISBN: 1439834539],2010.
8. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)

REFERENCE BOOKS:

1. Enterprise Cloud Computing by Gautam Shroff,Cambridge
2. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, Mastering Cloud Computing, published by McGraw Hill Publication (India) Private Limited, 2013 (ISBN 978-1-25-902995-0).
3. John W. Rittinghouse, James F. Ransome, Cloud Computing implementation, management and security, CRC Press, Taylor & Francis group, 2010.
4. Anthony T.velte, Toby J.velte Robert Elsenpeter, Cloud computing a practical approach, Tata Mc Graw Hill edition, 2010.

I Year II Semester	L	P	C
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INTERNET OF THINGS

Course Outcomes:

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

- Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
- Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
- Develop critical thinking skills
- Compare and contrast the threat environment based on industry and/or device type

UNIT – I: The Internet of Things: An Overview of Internet of things,Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices

UNIT – II: Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT – III: Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT – IV: Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT – V: Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

TEXT BOOKS:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015.

REFERENCES

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things CunoPfister , Oreilly

I Year II Semester	L	P	C
	3	0	3

CYBER SECURITY
(Elective-I)

Course Outcomes:
After completion of this course, student will be able to:

- Understand the broad set of technical, social & political aspects of Cyber Security.
- Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure.
- Understand the nature of secure software development, operating systems and data base design.
- Recognized the role security management plays in cyber security defense.
- Understand the security management methods to maintain security protection.
- Understand the legal and social issues at play in developing solutions

UNIT-I: Systems Vulnerability Scanning: Overview of vulnerability scanning, Open Port / Service Identification, Banner /Version Check, Traffic Probe, Vulnerability Probe, Vulnerability examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet

UNIT – II: Network Defense tools: Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System

UNIT – III: Web Application Tools: Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, Open SSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra

UNIT – IV:Introduction to Cyber Crime and law: Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.

UNIT – V:Introduction to Cyber Crime Investigation: Firewalls and Packet Filters, password Cracking,Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.

TEXT BOOKS:

1. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley

REFERENCE BOOKS:

1. The Official CHFI Study Guide for Computer Hacking Forensic Investigator by Dave Kleiman
2. CISSP Study Guide, 6th Edition by James M. Stewart

ARTIFICIAL INTELLIGENCE
(Elective-I)

Course Outcomes:
After completion of the course, the student will be able to:

- Describe Artificial Intelligence Techniques.
- Illustrate Knowledge Representation in AI
- Explain the concepts of planning and learning in AI

UNIT – I: Artificial Intelligence Introduction: The AI Problems, AI Technique, Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

UNIT –II: Heuristic Search Techniques: Generate and Test, Hill Climbing, Best First Approach, Problem Reduction, Constraint Satisfaction, Means-Ends analysis.

UNIT –III: Knowledge Representation using Predicate Logic and Rules: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge.

UNIT –IV: Planning: The Blocks World Example, Components of a Planning System, Goal Stack Planning, Nonlinear planning using constraint posting, Hierarchical Planning, Reactive Systems.

UNIT –V: Learning: Rote Learning, Learning by taking advice, Learning in problem solving, Learning from examples, Explanation Based Learning, Discovery, Analogy, Formal Learning Theory.

TEXTBOOK:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, Third Edition, Tata McGraw Hill Education Private Limited., 2009

REFERENCES:

1. Artificial intelligence A modern Approach , 3rd Ed, Stuart Russel, Peter Norvig, Pearson Education.
2. Introduction to Artificial Intelligence, Patterson, PHI
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

I Year II Semester	L	P	C
	3	0	3

BIO INFORMATICS
(Elective-I)

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

1. **Broad Understanding of Biology**: Students will interpret relationships among living things and analyze and solve biological problems, from the molecular to ecosystem level using basic biological concepts, grounded in foundational theories."
2. **Computer Programming**: Students will create computer programs that facilitate bioinformatics.
3. The students will be able to describe the contents and properties of the most important bioinformatics databases, perform text- and sequence-based searches, and analyze and discuss the results in light of molecular biological knowledge
4. The students will be able to explain the major steps in pairwise and multiple sequence alignment, explain the principle for, and execute Pairwise sequence alignment by dynamic programming

UNIT-I: Basic Biology: What is life? The unity and the diversity of living things, Prokaryotes and Eukaryotes, Yeast and People, Evolutionary time and relatedness, Living parts: Tissues, cells, compartments and organelles, Central dogma of molecular biology, Concept of DNA, RNA, Protein and metabolic pathway.
Bio Informatics: Introduction, What is Bioinformatics? Recent challenges in Bioinformatics, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction

UNIT-II: Biological databases: Their needs and challenges. Example of different biological databases – sequence, structure, function, micro-array, pathway, etc, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases, Genome Information Resources DNA sequence databases, specialized genomic resources

UNIT-III : Sequence Analysis: Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases.**Theory and Tools:** - Pairwise alignment – Different local and global search alignment, Heuristic searches (like BLAST) applicable to search against database, Multiple alignment algorithms, Whole genome comparison, Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.

UNIT-IV:Walk through the genome: Prediction of regulatory motifs, Operon, Gene, splices site, etc.
Markov models: Hidden Markov models – The evaluation, decoding and estimation problem and the algorithms. Application in sequence analysis

UNIT-V:Molecular phylogeny: maximum Parsimony, distance Matrix and maximum likelihood methods. Concepts of adaptive evolution.**Application of graph theory in Biology**: Biochemical Pathway, Protein-protein interaction network, Regulatory network and their analysis.

TEXT BOOKS:

1. Bioinformatics: Sequence, Structure and Databanks: A Practical Approach (The Practical Approach Series, 236), Des Higgins (Editor), Willie Taylor. 1st edition, October 2000, Oxford University Press. ISBN: 978-0199637904.
2. Bioinformatics: Sequence and Genome Analysis, David W. Mount. 2nd edition, June2004, Cold spring harbor laboratory press. ISBN: 978-0879697129
3. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic acids, R. Durbin, S.R. Eddy, A. Krogh and G. Mitchison.
4. Introduction to Bioinformatics, by T K Attwood & D J Parry-Smith **A**ddison Wesley Longman
5. Bioinformatics - A Beginner's Guide by Jean-Michel Claveriw, Cerdric Notredame, WILEY dreamlech India Pvt. Ltd

REFERENCE BOOKS:

1. Introduction to Bioinformatics by M.Lesk OXFORD publishers (Indian Edition)
2. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Second Edition, Andreas D. Baxevanis, B. F. Francis Ouellette. 3nd edition, October 2004, A John Wiley & Sons, Inc., Publication. ISBN: 978-0471478782.

I Year II Semester	L	P	C
	3	0	3

WIRELESS SENSOR NETWORKS
(Elective-I)

Course Outcomes:

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

- Identify the applications and challenges of MANETs
- Explain Ad-hoc network routing protocols
- Describe Broadcasting, Multicasting and Geocasting Routing Protocols
- Describe and Discriminate Wireless LANs, Wireless PANs & Wireless Mesh Networks

UNIT-I: Introduction: Introduction to MANETs, Applications of MANETs, Challenges

UNIT-II: Routing in Ad hoc networks: Topology-Based versus Position Based Approaches, Topology-Based routing Protocols, Position-Based Routing, Other Routing Protocols

UNIT-III: Broadcasting, Multicasting and Geocasting: The Broadcasting Storm, Broadcasting in a MANET, Multicasting, Issues in providing Multicast in a MANET, Geocasting, Geocast Routing Protocols

UNIT-IV: Wireless LANs: Why Wireless LANs, Transmission Techniques, Medium Access Control Protocol Issues, The IEEE 802.11 Standard for Wireless LANs, Enhancement to IEEE 802.1 MAC

UNIT-V: Wireless PANs & Wireless Mesh Networks: Why Wireless PANs, The Bluetooth Technology, Enhancements to Bluetooth, Wireless Mesh Network Architecture, MR Deployment, IGW Deployment, Channel Assignment

TEXT BOOK:

1. Ad hoc and Sensor Networks Theory and Applications, Carlos de Morais Cordeiro, Dharma Prakash Agarwal, Second Edition, World Scientific, 2011

REFERENCE BOOKS:

1. Adhoc Wireless Networks — Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy, Pearson Education, 2004
2. Ad hoc Networking, Charles E.Perkins, Pearson Education, 2001

I Year II Semester	L	P	C
	3	0	3

IMAGE PROCESSING
(Elective-II)

Course Outcomes:
After completion of this course, student will be able to:

- Understand the basics of image processing.
- Understand 2 D Transformations.
- Learn the Digital image properties.
- Acquire the knowledge of mathematical concepts for application on image morphing.
- Be able to conduct independent study and analysis of image processing problems and techniques.

UNIT-I: Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems DDA line algorithms: Bresenhams line and circle derivations and algorithms.

UNIT-II: 2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, Composite Transformations- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm.

UNIT-III: Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection.

UNIT-IV: Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation.

UNIT-V: Segmentation: Threshold detection methods, Optimal Thresholding, Edge based SegmentationEdge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation. Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

TEXT BOOKS:
1. Computer Graphics C Version, Donald Hearn, M Paulli Baker, Pearson (Unit I and Unit II) 2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)
REFERENCE BOOKS:
1. Computer & Machine Vision, Theory, Algorithms, Practicles, E R Davies, Elsevier, 4ed
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier

I Year II Semester	L	P	C
	3	0	3

PARALLEL ALGORITHMS
(Elective-II)

Course Outcome: At the end of this course the student be able to

- Understand parallel computing model PRAM, LMCC etc.,
- Understand the Efficiency of parallel algorithms,
- Understand parallel sorting network, parallel search algorithm,
- Understand graph algorithm, Permutation and combinations.

UNIT-I: Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

UNIT-II: Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Cost-optimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on various models.

UNIT-III: Parallel Sorting Networks, Parallel Merging Algorithms on Networks on CREW/EREW/MCC, Parallel Sorting CREW/EREW/MCC/, linear array.

UNIT-IV: Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

UNIT-V: Graph Algorithms - Connected Graphs, search and traversal, Combinatorial algorithms- Permutation, Combinations, Derangements.

TEXTBOOKS:

1. M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer", McGrawHill.
2. Akl, Selim G. AkM. Queen's University Kingston, Ontario, Canada. Prentice Hall, Englewood Cliffs, New Jersey 07632.
3. S.G. Akl, "Parallel Sorting Algorithm" by Academic Press.

REFERENCE BOOK:

1. Parallel Programming, Barry Wilkinson, Michael Allen, Pearson Education, 2nd Edition.
2. Introduction to Parallel algorithms by Jaja from Pearson, 1992.

I Year II Semester	L	P	C
	3	0	3

MOBILE COMPUTING
(Elective-II)

Course Outcomes:
After completion of this course, student will be able to:

- Describe the basic concepts and principles in mobile computing.
- Understand the concept of Wireless LANs, PAN, Mobile Networks, and Sensor Networks.
- Understand positioning techniques and location based services and applications.
- Describe the important issues and concerns on security and privacy.

UNIT–I: Introduction to Mobile Communications and Computing: Introduction to cellular concept, Frequency Reuse, Handoff, GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Introduction to mobile computing, novel applications, limitations, and architecture.

UNIT - II: **Wireless LANs:** Introduction, Advantages and Disadvantages of WLANs, WLAN Topologies, Introduction to Wireless Local Area Network standard IEEE 802.11, Comparison of IEEE 802.11a, b, g and n standards, Wireless PANs, Hiper LAN, Wireless Local Loop

UNIT - III: **Wireless Networking:** Introduction, Various generations of wireless networks, Fixed network transmission hierarchy, Differences in wireless and fixed telephone networks, Traffic routing in wireless networks, WAN link connection technologies, X.25 protocol, Frame Relay, ATM, Virtual private networks, Wireless data services, Common channel signaling, Various networks for connecting to the internet.

UNIT - IV: **Database Issues:** Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system, disconnected operations.

UNIT - V: **Data Dissemination:** Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

TEXT BOOKS:

1. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson Education, First Edition, 2013.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002.

REFERENCE BOOKS:

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004, 2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren,
2. "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, 2003.
4. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003.

I Year II Semester	L	P	C
	3	0	3

GRID COMPUTING
(Elective-II)

Course Outcomes:
After completion of this course, student will be able to:

- Understand the need for and evolution of Grids in the context of processor- and data-intensive applications
- Be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery
- Be able to design and implement Grid computing.
- Be able to justify the applicability, or non-applicability, of Grid technologies for a specific application.

UNIT - I: **Introduction:** Introduction to Parallel, Distributed Computing, Cluster Computing and Grid Computing, Characterization of Grids, Organizations and their Roles, Grid Computing Road Maps.

UNIT - II: **Architecture:** Architecture of Grid and Grid Computing, Review of Web Services-OGSA-WSRF.

UNIT - III: **Grid Monitoring:** Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE - JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridM **Grid Middleware:** List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features.

UNIT - IV: **Data Management And Grid Portals:** Data Management, Categories and Origins of Structured Data, Data Management Challenges, Architectural Approaches, Collective Data Management Services, Federation Services, Grid Portals, First-Generation Grid Portals, Second Generation Grid Portals.

UNIT - V: **Semantic Grid and Autonomic Computing:** Meta data and Ontology in the Semantic Web, Semantic Web services, Layered structure of the Semantic Grid, Semantic Grid activities, Autonomic Computing **Grid Security and Resource Management:** Grid Security, A Brief Security Primer, PKI-X509 Certificates, Grid Security, Scheduling and Resource Management, Scheduling Paradigms, Working principles of Scheduling, A Review of Condor, SGE, PBS and LSF - Grid Scheduling with QoS.

TEXT BOOKS:

1. Grid Computing, Joshy Joseph and Craig Fellenstein, Pearson Education 2004.
2. The Grid Core Technologies, Maozhen Li, Mark Baker, John Wiley and Sons, 2005.

REFERENCE BOOKS:

1. The Grid 2 - Blueprint for a New Computing Infrastructure, Ian Foster and Carl Kesselman, Morgan Kaufman - 2004.
2. Grid Computing: Making the Global Infrastructure a reality, Fran Berman, Geoffrey
   Fox, Anthony J.G. Hey, John Wiley and sons

DATA SCIENCE LAB

Course Outcomes:

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

- Understand the Concepts of R and Programming.
- Understand the mathematics from a numerical point of view, including the application of these concepts root-finding, numerical integration and optimization
- Understand the purpose for random variable and expectations required to understand simulations
- Implement the Monte carlo and Stochastic Modelling
- Work effectively in teams on data science projects using R

LIST OF EXPERIMENTS

1. R Environment Setup & R as calculating environment
2. R Basic programming, Input and output
3. Programming with functions & Sophisticated Data structures
4. Better Graphics using Graphics parameters
5. Frames and environments & Object –oriented Programming
6. Numerical Accuracy and program efficiency
7. Probability & Statistics: The law of Total probability
8. Simulation: Monte Carlo Integration – Hit and miss method
9. Data Modelling: Linear and Multiple Regression Models

Case Study

Consider the data set of Ozone levels in United States for the year 2014 and do the following analysis

1. Formulate your questions
2. Read in your data
3. Check the packaging
4. Look at the top and the bottom of your data
5. Check your "n" s
6. Validate with at least one external data source
7. Make a plot
8. Follow up

TEXT BOOKS:

1. Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014
2. The Art of Data Science: A Guide for Anyone Who Works with Data, Roger D. Peng, Elizabeth Matsui, LeanPub, 2015.
3. Data Science for Business: What You Need to Know about Data Mining and Data - analytic Thinking, Foster Provost and Tom Fawcett. 2013
4. Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2009.

REFERENCE BOOKS:

1. Mining of Massive Datasets, JureLeskovek, Anand Rajaraman and Jeffrey Ullman, Cambridge University Press. 2014.
2. Machine Learning: A Probabilistic Perspective.Kevin P. Murphy, MIT Press, 2013.
3. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.
4. Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr., Cambridge University Press. 2014.
5. R Programming for Data Science, Roger D. Peng, LeanPub, 2015.
6. Python for Data Science for Dummies, Luca Massaron and John Paul Mueller, John Wiley and Sons, 2015.

WEB TECHNOLOGIES LAB

List of Experiments

1. a) A Simple HTML home page provide links to move to other pages like hobbies, educational info, personal info etc.
   b) A HTML program to illustrate the use of frame and frameset tags of HTML.
   c) A HTML Program which use a HTML controls to create a student information form to collect student's information like name, address, phone, email, sex, birth date, hobbies etc.
2. a) Create a webpage which displays "Hello World" with font size 20 pixels, bold format, in "Times New Roman" font and green in colour using inline CSS, embedded CSS and external CSS.

   b) Create a webpage which displays the class time table and apply the following effects on the table:

- ➔ For the table header apply *blue* as the background colour and *white* for the colour of the text in the table header.
- ➔ Display *day names* (Mon, Tue etc...) in bold format with the first letter in the day name in uppercase.
- ➔ Display *lunch* slightly in bigger font other than the remaining text.

   c) Create a webpage to manage personal details like name, class, qualifications, photo, address etc., using tables and other suitable HTML tags. Apply the following style information:

- ➔ Display the heading of the page in *Times New Roman* font and with 24px size.
- ➔ Align all the field names like Name, Class, Photo etc to *right* in the table.
- ➔ Apply *light blue* as background colour for the left side cells in the table which contains field names like Name, Class etc...
- ➔ Also display your college logo as background image in the top right position of the web page.

   d) Create a web page containing two images, where one image overlaps another image by using the *z-index* CSS property.

3. a) A HTML Program which demonstrates loops like for loop, do while, while in java script.
   b) A HTML Program which demonstrates the use of functions in java script.
   c) A HTML Program which demonstrates various events like onclick, ondbclick, onfocus, onblur, onchange, onmouseover, onmouseover, window event, onload, onunload event.
   d) A HTML Program to create various functions and sub routines to validate the data entered by user in form.

4. a) Create a program to illustrate the concept of associative array in PHP.
   b) Create PHP program to implement the concept of Session management.
   c) Create a PHP program to display student information in webpage. Student's data is stored in My SQL database.
   d) Create a PHP program to insert student information from HTML form. Student's data is stored in My SQL database.
5. a) Create a well-formed XML document.
   b) Create a valid XML document using DTD.
   c) Create a valid XML document using XML Schema.
   d) Create a XML document which contains details of cars and display the same as a table using XSLT.
   e) Write a Java program to parse the XML document containing car details using SAX API.

6. a) Create a servlet to display "Hello World" in the browser.
   b) Create a servlet to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a servlet to retrieve name and branch details from a html page and print the same using the servlet.
   e) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to another servlet where the values stored in the session are retrieved and displayed.

7. a) Create a JSP page to display "Hello World" in the browser.
   b) Create a JSP page to store email-id as an initialization parameter and print the same email-id by reading the initialization parameter from the web.xml file.
   c) Create a JSP page to retrieve name and branch details from a html page and print the same using a servlet.
   d) Create a HTML page which accepts book id, book name and book price and a submit button. When the user clicks the submit button, all the values assigned to the previous text fields must be stored in a session object and the control forwards to a JSP page where the values stored in the session are retrieved and displayed.

8. Create a HTML page which accepts student regd.no. and prints the results of that student by retrieving the results from the database. Use AJAX to display the "please wait..." while the server is processing the request and print the result of the student when the server returns the result. Server resource can be either servlet or JSP or PHP

Reference Books:

6. "*Java server programming java JavaEE5 Black Book*", Kogent Solutions Dreamtech Press, Inc, ISBN-13 9788177228359 ISBN-10 8177228358, 2008.
7. "*AJAX black book*", new edition, Kogent Solutions Inc, Dreamtech Press, ISBN:10-81-7722- 838-2 ISBN:13-978-81-7722-838-0 6
   3. Jonathan Chaffer, Karl Swedberg, "*Learning jQuery*", 3rd Edition , , ISBN 13: 9781849516549, 2011
8. Chris Bates,*Web Programming- building internet applications*, 2nd edition, WILEY Dreamtech, 2006
9. Patrick Naughton and Herbert Schildt, The *complete Reference Java seventhEdition*,TMH, 2007
10. Hans Bergsten, Java *Server Pages*, SPD O'Reilly, 2000
11. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
12. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
13. Beginning Web Programming-Jon Duckett WROX.
14. Java Server Pages, Pekowsky, Pearson.
15. Java Script,D.Flanagan,O'Reilly, SPD.