JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

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Course Structure for 5th and 6th Semester CSE

5th Semester, CSE

Sl. No	Course Code	Category	Subject	L	T	P	Credit
	CS501	Professional Core-I	Computer Organization and Architecture	4	1	0	4
2	CS502	Professional Core-II	Compiler Design	3	1	0	3
3	CS503	Professional Core-III	Computer Graphics	3	1	0	3
4		Professional Electives-I	List of Professional Electives-I	3	1	0	3
5		Open Elective-1	List of Open Elective-1	3	1	0	3
Laboratory/Sessional							
1	CS501P	Laboratory-I	Computer Organization and Architecture Lab.	0	0	3	1
2	CS502P	Laboratory-II	Compiler Design Lab.	0	0	3	1
3	CS503P	Laboratory-III	Computer Graphics Lab.	0	0	3	1
4		Laboratory-IV	Professional Electives-I Lab.	0	0	3	1
5		Laboratory-V	General Proficiency / Seminar	0	0	2	2
Total Credits (Theory + Sessional)							22

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List of Electives 5thSemester CSE

Professional Elective-I	
Course No.	Subject Name
IT502	Web Technology
CS504	Linux Programming
CS505	System Analysis and Design
IT503	Semantics Web
Open Elective-I	
Course No.	Subject Name
CS602	Data Science*
CS506	Computer Architecture*
	Data Base Management Systems*
	Data Communication

*These subjects are open for all the branches other than CSE and IT.

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6th Semester, CSE

S. No	Course Code	Category	Subject	L	T	P	Credit
1	CS601	Professional Core-I	Computer Networks	4	1	0	4
2	CS602	Professional Core-II	Data Science	3	1	0	3
3	CS603	Professional Core-III	Image Processing	3	1	0	3
4		Professional Electives-II	List of Professional Electives-II	3	1	0	3
5		Open Elective-II	List of Open Elective-II	3	1	0	3
Laboratory/Sessional							
1	CS601P	Laboratory-I	Computer Networks Lab.	0	0	3	1
2	CS602P	Laboratory-II	Data Science Lab.	0	0	3	1
3	CS603P	Laboratory-III	Image Processing Lab.	0	0	3	1
4		Laboratory-IV	Professional Electives-II Lab.	0	0	3	1
5		Laboratory-V	Internship/Tour & Training /Industrial Training	0	0	2	2
Total Credits (Theory + Sessional)							22

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List of Electives 6th Semester, CSE

Professional Elective-II	
Course No.	Subject Name
CS604	Soft Computing
CS605	System Software
CS606	Distributed System
CS607	Natural Language Processing
CS608	Software Engineering
Open Elective-II	
Course No.	Subject Name
IT601	Information Retrieval
CS609	AI and Machine Learning*
CS601	Computer Network*
IT602	Internet Of Things (IOT)

*These subjects are open for all the branches other than CSE and IT.

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Course Structure for 5th and 6th Semester IT

5th Semester, IT

Sl. No	Course Code	Category	Subject	L	T	P	Credit
1	CS501	Professional Core-I	Computer Organization and Architecture	4	1	0	4
2	IT501	Professional Core-II	Information System	3	1	0	3
3	CS503	Professional Core-III	Computer Graphics	3	1	0	3
4		Professional Electives-I	List of Professional Electives-I	3	1	0	3
5		Open Elective-1	List of Open Elective-1	3	1	0	3
Laboratory/Sessional							
1	CS501P	Laboratory-I	Computer Organization and Architecture Lab.	0	0	3	1
2	IT501P	Laboratory-II	Information System Lab.	0	0	3	1
3	CS503P	Laboratory-III	Computer Graphics Lab.	0	0	3	1
4		Laboratory-IV	Professional Electives-I Lab.	0	0	3	1
5		Laboratory-V	General Proficiency / Seminar	0	0	2	2
Total Credits (Theory + Sessional)							22

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5th Semester, electives list IT

Professional Elective-I	
Course No.	Subject Name
IT502	Web Technology
CS504	Linux Programming
CS502	Compiler Design
IT503	Semantics Web
Open Elective-I	
Course No.	Subject Name
CS602	Data Science*
CS610	Computer Architecture*
	Data Base Management Systems*
	Data Communication

*These subjects are open for all the branches other than CSE and IT.

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6th Semester, IT

S. No	Course Code	Category	Subject	L	T	P	Credit
1	CS601	Professional Core-I	Computer Networks	4	1	0	4
2	CS602	Professional Core-II	Data Science	3	1	0	3
3	CS603	Professional Core-III	Image Processing	3	1	0	3
4		Professional Electives-II	List of Professional Electives-II	3	1	0	3
5		Open Elective-II	List of Open Elective-II	3	1	0	3
Laboratory/Sessional							
1	CS601P	Laboratory-I	Computer Networks Lab.	0	0	3	1
2	CS602P	Laboratory-II	Data Science Lab.	0	0	3	1
3	CS603P	Laboratory-III	Image Processing Lab.	0	0	3	1
4		Laboratory-IV	Professional Electives-II Lab.	0	0	3	1
5		Laboratory-V	Internship/Tour & Training /Industrial Training	0	0	2	2
Total Credits (Theory + Sessional)							22

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6th Semester, elective list IT

Professional Elective-II	
Course No.	Subject Name
CS604	Soft Computing
CS605	System Software
CS606	Distributed System
CS607	Natural Language Processing
CS607	Software Engineering
Open Elective-II	
Course No.	Subject Name
IT601	Information Retrieval
CS609	AI and Machine Learning*
CS601	Computer Network*
IT602	Internet Of Things (IOT)

*These subjects are open for all the branches other than CSE and IT.

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Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

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Detailed Syllabus

Computer Science & Engineering and Information Technology					
Code: CS501	**Computer Organization and Architecture**	**L**	**T**	**P**	**C**
		4	**1**	**0**	**4**

This course open to all branch except CSE/IT.

Course Outcomes:

1. Ability to describe the organization of computer and machine instructions and programs
2. Ability to analyze Input / Output Organization
3. Analyze the working of the memory system and basic processing unit.
4. Ability to solve problems of multicores, multiprocessors and clusters.
5. Choose optical storage media suitable for multimedia applications.

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO1	-	3	-	2	2	-	-	-	-	-	-	1
CO2	2	2	2	2	2	-	-	-	-	-	-	2
CO3	2	2	2	2	3	-	-	-	-	-	-	2
CO4	3	3	3	2	2	-	-	-	-	-	-	2
Average												

**3: high, 2: moderate, 1 low*

MODULE-I:

Basics of Digital Electronics: Multiplexers and De multiplexers, Decoder andEncoder, Codes, Logic gates, Flip flops, Registers.
Register Transfer and Micro Operations: Bus and Memory Transfer, Logic Micro Operations, Shift Micro Operations, Register transfer and register transfer language, Design of arithmetic logic unit.

MODULE II:

Basic Computer Organization: Instruction codes, Computer instructions, Timing and Control, Instruction cycle, Memory reference Instruction, Complete computer description, Design of basic computer, Input output and interrupt.

MODULE III:

Control Unit: Hardwired controls, Micro programmed controls.
Central Processing Unit : Program control, Reduced instruction set computer, Complex instruction set computer, Data Transfer, Manipulation, General register and stack organization, Addressing mode.

MODULE IV:

Computer Arithmetic: Addition and subtraction algorithm, Multiplication algorithm, Division algorithms.

MODULE V:

Input-Output Organization: Priority interrupt, Peripheral devices, Input output interface, Data transfer schemes, Program control and interrupts, Direct memory access transfer, Input/output processor.
Memory Unit: High speed memories, Memory hierarchy, Processor Vs Memory speed, Cache memory, Associative memory, Inter leave, Virtual memory, Memory management.

MODULE VI :

Introduction to Parallel Processing: Pipelining, Characteristics of multiprocessors, Interconnection structures, Inter processor arbitration, Inter processor communication, Synchronization.

Text Books:

1. Computer System Architecture by Morris Mano, Prentice hall, 3rd Edition, (2007)

References:

1. Computer Organization by Carl Hamacher, ZvonkoVranesic, SafwatZaky, Tata Mcgraw Hill, 5th Edition, (2011)

2. Computer Architecture : A Quantitative Approach by Hennessy, J. L, David A Patterson, and Goldberg, Pearson Education, 4th Edition, (2006)

Computer Science & Engineering					
Code: CS502	**Compiler Design**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Pre-requisites: knowledge of automata theory, context free languages, computer architecture, data structures and simple graph algorithms, logic or algebra.

MODULE-I:

Introduction to compiler and Finite automata

Compilers, Analysis of source programs, Tokens, patterns, lexemes, Phases of compilers, Parsing, Parse trees, Ambiguity, Associativity and precedence of operators, Top-down parsing, Bottom-up parsing, Left recursion, Syntax directed translation. Classification of grammars, NFA, DFA, Conversion of NFA to DFA, RE to NFA (Thompson's Construction), Optimization of NFA/DFA using FIRSTPOS, LASTPOS, FOLLOWPOS.

MODULE-II:

Context Free Grammar

RE vs. CFG, Eliminating ambiguity and left recursion, Left factoring.

MODULE-III:

Compiler Parser

Top down parsing-LL parser, LL grammars. Bottom up parsing- LR parser, SLR parser, CLR parser, LALR parser. Polishing expressions Operator precedence grammar. LR grammars. Comparison of parsing methods. Error handling.

MODULE-IV:

Run time environments

Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation technique, Organization for non-block and block structured languages.

MODULE-V:

Intermediate code generation

Intermediate languages, graphical representations, Synthesized and inherited attributes, Dependency graph, Syntax directed translation, S and L- attributed definitions, Polish notation, Three address, quadruples, triples, indirect triples Flow of control statement.

MODULE-VI:

Code optimization and code generation

Basic blocks and flow graphs, Optimization of basic blocks, Code optimization techniques, Issues in design of code generator, Target machine code and simple code generator.

Suggested Text Books

- Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Monica S. Lam, *Compilers: Principles, Techniques, and Tools*. Addison-Wesley, 2006 (optional).
- Thomas W. Parsons, *Introduction to Compiler Construction*. Computer Science Press,**1992.**

Suggested Reference books

- Compiler design in C, A.C. Holub, PHI.
- Compiler construction (Theory and Practice), A.Barret William and R.M. Bates, Galgotia Publication.
- Compiler Design, Kakde.
-

COURSE OUTCOMES

1	*Identify* the issue that arises in the design and construction of translator for programming language.
2	*Analyze* RE and CFG to specify the lexical and syntactic structure of programming language.
3	*Design* different parsers from given specification.
4	*Assess* the various program transformations.
5	*Design* a compiler for a programming language.

CO-PO MAPPING

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
1	-	3	2	2	-	-	-	-	-	1	-	-
2	-	3	-	2	-	-	-	-	-	-	-	-
3	-	-	2	2	-	-	-	-	-	2	-	-
4	-	2	-	2	-	-	-	-	-	-	-	-
5	-	-	2	1	-	-	-	-	-	1	-	-

**3: high, 2: moderate, 1: low*

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Computer Science & Engineering					
Code: CS503	**Computer Graphics**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Objectives of the course:

This course covers basics of computer graphics. Computer graphics are pictures and films created using computers. Usually, the term refers to computer-generated image data created with the help of specialized graphical hardware and software. It is a vast and recently developed area of computer science. Computer graphics is responsible for displaying art and image data effectively and meaningfully to the consumer. It is also used for processing image data received from the physical world. Computer graphics development has had a significant impact on many types of media and has revolutionized animation, movies, advertising, video games, and graphic design in general.

Course Outcomes

After completing this course, the student will be able to:

CO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO2	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
CO3	Use of geometric transformations on graphics objects and their application in composite form.
CO4	Extract scene with different clipping methods and its transformation to graphics display device.
CO5	Render projected objects to naturalize the scene in 2D view and use of illumination models for this

Module – I:
Introduction to computer graphics and graphics systems. Raster and vector graphics systems, video display devices, physical and logical input devices, simple color models.

Module – II:
Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Module – III:
2D Transformation : Basic transformations : translation, rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems ; reflection shear ; Transformation of points, lines, parallel lines, intersecting lines.

Module – IV:
Viewing pipeline, Window to Viewport co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse.

Module – V:
Hidden Surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry. Rendering of a polygonal surface; Flat, Gouraud, and Phong shading; Texture mapping, bump texture, environment map; Introduction to ray tracing; Image synthesis, sampling techniques, and anti-aliasing.

Text Books

1. Donald Hearn and Pauline Baker Computer Graphics, Prentice Hall, New Delhi, 2012

2. Steven Harrington, "Computer Graphics- A programming approach", McGraw 3. Hill, 2nd Edition, 1987.

Reference Book

3. Foley J.D., Van Dam A, "Fundamentals of Interactive Computer Graphics", Addison Wesley, 1990

Computer Science & Engineering					
Code: IT502	**Web Technology**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective: The focus in this course is on the World Wide Web continues to provide a foundation for the developmentofabroadrangeofincreasinglyinfluentialandstrategictechnologies,supporting a large variety of applications and services, both in the private and public sectors. There is a growing need for management and decision makers to gain a clearer understanding of the application development process, from planning through to deployment and maintenance. In this course, you will learn about the HTTP communication protocol, the markup languages HTML, XHTML and XML, the CSS standards for formatting and transforming web content, interactive graphics, multimedia content on the web, client-side programming using Javascript; an understanding of approaches to more dynamic and mobile content; and demonstrate how you can analyze requirements, plan, design, implement and test arrange of webapplications.

Course Prerequisite

- Programming for Problemsolving.
- Object Oriented Programming ThroughJava.
- Basic concept ofNetworking.

Course Outcomes

After Successful completion of course, the students will be able to

CO	Description
CO 1	**Describe** various web technology and application development issues and trends.
CO 2	**Design** static and dynamic web pages using HTML, CSS and Java Script.
CO 3	**Design** and implement web services from the server and client side.
CO 4	**Build** interactive Web applications using JSP and Servlet.
CO 5	**Identify** the engineering structural design of XML and parse construction tree model.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CO 1	-	3	-	-	-	-	-	-	-	2	-	-
CO 2	3	2	3	2	3	1	-	-	-	-	-	-
CO 3	-	-	3	-	2		-	-	2	-	-	-
CO 4	2	2	3	-	2	1	-	-	-	-	-	-
CO 5	2	2	-	-	-	-	-	-	-	-	-	-
Avg	2.33	2.25	3	2	2.33	1			2	2		

Note- *3: high, 2: moderate, 1 low*

Module – I

Introduction to html: Fundamentals of HTML elements, Document body, Different tags, sections, text, hyperlink, lists, tables, color and images, frames, frameset, form.

Web Pages: types and issues, tiers; comparisons of Microsoft and java technologies; WWW: Basic concept, web client and web server, HTTP protocol (frame format), universal resource locator (URL).

Module – II

Dynamic web pages: The need of dynamic web pages; an overview of DHTML, Cascading Style Sheets (CSS), comparative studies of different technologies of dynamic page creation.
Active web pages: Need of active web pages; java applet life cycle.

Module – III

JavaScript: Data types, variables, operators, conditional statements, array object, date object, string object.

Java Servlet: Servlet environment and role, HTML support, Servlet API, the Servlet Life cycle, cookies and sessions.

Module – IV

JSP: JSP architecture, JSP servers, JSP tags, understanding the layout in JSP, Declaring Variables, methods in JSP, inserting java expressions in JSP, processing request from user and generating dynamic response for the user, inserting applets and java beans into JSP, using include and forward action, comparing JSP and CGI program, comparing JSP and ASP program; Creating ODBC data source name, introduction to JDBC, prepare statement and callable statement.

Module – V

J2EE:AnoverviewofJ2EEwebservices,basicsofEnterpriseJavaBeans,EJBvs.JavaBeans,basic of RMI,JNI.

XML: Basics XML, elements and attributes, document type definition, xml parsers, sequential and tree approach

Text Books:

1. ChrisBates,"WebProgramming:BuildingInternetApplications",WileyDreamTech, 2nd Edition,2002.
2. Jeffrey C K Jackson, Web Technologies", Pearson Education, 1stEdition,2006.
3. JasonHunter,WilliamCrawford—JavaServletProgrammingO'Reilly Publications, 2nd Edition, 2001.

References

1. W Hans Bergsten, "Java Server Pages", O"Reilly, 3rd Edition,2003.
2. D. Flanagan, "Java Script", O"Reilly, 6th Edition,2011.
3. Jon Duckett, "Beginning Web Programming", WROX, 2nd Edition,2008.
4. Herbert Schildt, "Java the Complete Reference", Hill - Osborne, 8th Edition,2011.

List of Open Source Software/learning website:

- Browsers like IE, Mozilla, Firefoxetc.
- Server softwareXAMPP/WAMP/LAMP.
- www.apachefriends.org
- www.w3.org
- www.w3schools.com
- www.php.net
- www.mysql.com
- www.phpmyadmin.net
- www.javatpoint.com

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Computer Science & Engineering					
Code: CS504	**Linux Programming**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**0**

Course objectives:

CO1: able to understand the basic commands of Linux operating system and can write shell scripts.

CO2: able to create file systems and directories and operate them

CO3: Students will be able to create processes background and fore ground etc. by fork() system calls

CO4: able to create shared memory segments, pipes, message queues and can exercise inter process communication

CO PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO1	2	2	2	-	-	-		-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-
CO4	3	3	3	1	-	-	-	-	-	-	-	-

Module -I: Linux Utilities:

File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities, Backup utilities;

Shell programming with Bourne Again Shell (bash): Introduction, Shell responsibilities, Pipes and redirection, here documents, Running a shell script, Shell as a programming language, Shell meta characters, File-name substitution, Shell variables, Command substitution, Shell commands, The environment, Quoting, test command, Control structures, Arithmetic in shell, Shell script examples, Interrupt processing functions, Debugging shell scripts.

Module-II: Files and Directories:

File concepts, File types File system structure, file metadata - Inodes, kernel support for files, System calls for the file I/O operations- open,create,read,wrirte,close,lseek,dup2,file status information-stat family, file and record locking-fcntl function, file permissions- chmod, fchmod, file ownership- chown, lchown, fchown, links-soft links and hard links- symlink, link, unlink.

Directories: Creating, removing and changing Directories- mkdir, rmdir, chdir, obtaining current working directory- getcwd, directory contents, scanning directories- opendir, readdir, rewin functions.

Module- III:

Process: Process concept, Layout of a C program image in main memory, Process environment – environment list, environment variables, getenv, setenv, Kernel support for process, Process identification, Process control -

Process creation, replacing a process image, waiting for process, Process termination, Zombie process, Orphan process, ,system call interface for process management – fork, vfork, exit, wait, waitpid, exec family, process groups, sessions and controlling Terminal, differences between threads and processes.

Signals: Introduction to signals, Signal generation, Signal handling, Kernel support for signals, signal function, Unreliable signals, Reliable signals, Signal functions: kill, raise, alarm, pause, abort, sleep.

Module- IV:

Inter process Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, Pipes-creation IPC between related processes using FIFOs (Named pipes), differences between unnamed and named pipes, popen and pclose library functions.

Message Queues: Kernel support for messages, APIs for message queues, Client/Server example

Semaphores: Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

Module-V:

Shared Memory: Kernel support for Shared Memory, APIs for Shared Memory, Shared Memory example.

Sockets: Introduction to Berkley Sockets, IPC over a network, client – server model, Socket address structures (Unix domain and internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example- client/server programs- single server- client connection, multiple simultaneous clients, socket options- setsockopt and fcntl system calls, comparison of IPC mechanisms.

TEXT BOOKS:-

1. Unix System Programming using C++, T. Chan, PHI.
2. Unix concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Willey India Edition.

REFERRENCE BOOKS:

1. Linux System Programming. Robert Love, O'Reilly, SPD.
2. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. Unix Network Programming, W.R.Steven, PHI.
4. UNIX for Programming and users, 3rd Edition, Graham Glass, King Ables, Pearson Edition.
5. UNIX and shell Programming, B.A.Forouzan and R.F.Koretsky, S.A.Sarawar, Pearson edition.
6. Unix The Text book, 2nd edition, S.M.Sarawar, Koretsky, S.A.Sarawar, Pearson Edition

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Computer Science & Engineering					
Code: CS505	**System Analysis and Design**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OUTCOMES:

CO 1	Identify the issue that arises in the design of systems as a whole
CO 2	Ability to understand the Software Development Life Cycle
CO 3	Students will be able to understand different types of system designing and Modelling
CO 4	Students will be able to understand Maintenance, Testing and structured Design
CO 5	Ability to understand the Security and Threats

CO-PO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO 1	-	3	2	2	-	-	2	-	-	1	-	-
CO 2	-	3	-	2	-	-	-	-	-	-	-	-
CO 3	-	-	2	2	-	3	-	-	-	2	-	-
CO 4	-	2	-	2	-	-	-	-	-	-	-	-
CO 5	-	-	2	1	-	-	-	-	-	1	-	-

**3: high, 2: moderate, 1: low*

MODULE- I:

INTRODUCTION

System definition and concepts: Characteristics and types of system, Manual and automated systems

Real-life Business sub-systems: Production, Marketing, Personal, Material, Finance

Systems models types of models: Systems environment and boundaries, Real-time and distributed systems, Basic principles of successful systems

MODULE- II:

SYSTEMS ANALYST

Role and need of systems analyst, Qualifications and responsibilities, Systems Analyst as and agent of change,

Introduction to systems development life cycle (SDLC):

Various phases of development: Analysis, Design, Development, Implementation, Maintenance

Systems documentation considerations: Principles of systems documentation, Typesof documentation and their importance, enforcing documentation discipline in anorganization.

System Planning

Data and fact gathering techniques: Interviews, Group communication, Presentations, Sitevisits. Feasibility study and its importance, Types of feasibility reports System Selection plan and proposal Prototyping

Cost-Benefit and analysis: Tools and techniques

MODULE- III:

SYSTEMS DESIGN AND MODELING

Process modeling, Logical and physical design, Design representation, Systems flowcharts and structured charts, Data flow diagrams, Common diagramming conventions and guidelines using DFD and ER diagrams. Data Modeling and systems analysis, designing the internals: Program and Process design, Designing Distributed Systems.

Input and Output Classification of forms: Input/output forms design, User-interface design, Graphical interfaces

MODULE- IV:

MODULAR AND STRUCTURED DESIGN

Module specifications, Module coupling and cohesion, Top-down and bottom-up design

System Implementation and Maintenance

Planning considerations, Conversion methods, producers and controls, System acceptance Criteria, System evaluation and performance, Testing and validation, Systems quality Control and assurance, Maintenance activities and issues.

MODULE- V:

SYSTEM AUDIT AND SECURITY

Computer system as an expensive resource: Data and Strong media Procedures and norms for utilization of computer equipment, Audit of computer system usage,Audit trails

Types of threats to computer system and control measures: Threat to computer system and control measures, Disaster recovery and contingency planning

Object Oriented Analysis and design

Introduction to Object Oriented Analysis and design life cycle, object modeling: Class Diagrams, Dynamic modeling: state diagram, Dynamic modeling: sequence diagramming.

TEXT BOOKS: -

1. System Analysis and Design Methods, Whitten, Bentaly and Barlow, Galgotia Publication.

2. System Analysis and Design Elias M. Award, Galgotia Publication

REFERENCES

3. Modern System Analysis and Design, Jeffrey A. Hofer Joey F. George JosephS. Valacich Addison Weseley.

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Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: IT503	**Semantics Web**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OUTCOMES:

CO1	*Understand* and *explain* the overall architecture of semantic web and to illustrate the overview of design principles and technologies in semantic web.
CO2	*Design and implement* a small ontology that is semantically descriptive of your chosen problem domain, implement applications that can access, use and manipulate the ontology, represent data from a chosen problem in XML with appropriate semantic tags obtained or derived from the ontology.
CO3	*Describe* the semantic relationships among these data elements using Resource Description Framework (RDF).
CO4	*Design and implement* a web services application that ―discovers‖ the data and/or other web services via the semantic web (which includes the RDF, data elements in properly tagged XML, and the ontology), discover the capabilities and limitations of semantic web technology for different applications.

CO-PO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	3	2	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	3	3	2	-	-	-	-	-	-	2	-
Avg.	1.5	1.5	1.5	1	-	-	-	-	-	-	1	-

**3: high, 2: moderate, 1 low*

DETAIL SYLLABUS:

MODULE-I:

INTRODUCTION

Introduction to the Syntactic Web and Semantic Web – Evolution of the Web – the Visual and Syntactic Web – Levels of Semantics – Metadata for Web Information – theSemantic Web Architecture and Technologies – Contrasting Semantic with Conventional Technologies– Semantic Modelling -Potential of Semantic Web Solutions and Challenges of AdoptionDesign Principles.

MODULE-II:

KNOWLEDGE REPRESENTATION AND ONTOLOGIES

Knowledge Representation and Reasoning - Ontologies- Taxonomies –Topic Maps – Classifying Ontologies - Terminological Aspects: Concepts, Terms, Relations Between Them – Complex Objects -Subclasses and Sub-properties definitions –Upper Ontologies – Quality – Uses - Types of Terminological Resources for Ontology Building – Methods and Methodologies for Building Ontologies – Multilingual Ontologies -Ontology Development Process and Life Cycle – Methods for Ontology Learning – Ontology Evolution – VersioningOntologies in Semantic Web.

MODULE-3:

STRUCTURING AND DESCRIBING WEB RESOURCES

Structured Web Documents - XML – Structuring – Namespaces – Addressing – Querying – Processing - RDF – RDF Data Model – Serialization Formats- RDF Vocabulary –InferencingRDFS – basic Idea – Classes – Properties- Utility Properties – RDFS Modelling forCombinations and Patterns- Transitivity.

MODULE-4:

WEB ONTOLOGY LANGUAGE

OWL – Sub-Languages – Basic Notions -Classes- Defining and Using Properties – Domain and Range – Describing Properties - Data Types – Counting and Sets- Negative Property Assertions – Advanced Class Description – Equivalence – OWL Logic.

MODULE-5:

SEMANTIC WEB TOOLS AND APPLICATIONS

State - of- the- Art in Semantic Web Community-Development Tools for Semantic Web – Jena Framework – SPARL –Querying Semantic Web- Semantic Desktop – Semantic Wikis - Semantic Web Services – Application in Science – Business

TEXTBOOKS:

1. LiyangYu,‖A Developer‘s Guide to the Semantic Web‖, Springer, First Edition, 2011.

2. John Hebeler, Matthew Fisher, Ryan Blace and Andrew Perez-opez, ―Semantic Web Programming‖, First Edition, Wiley, 2009.

3. Grigoris Antoniou, Frank van Harmelen, ―A Semantic Web Primer‖, Second Edition, MIT Press, 2008. 4. Robert M.Colomb,‖Ontology and the Semantic Web‖, Frontiers in Artificial Intelligence and Applications, IOS Press, 2007.

5. Dean AllemangandJamesHendler,‖Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL‖, Second Edition, Morgan Kaufmann, 2011.

6. Pascal Hitzler, Markus Krotzsch, Sebastian Rudolph, ―Foundations of Semantic Web Technologies, CRC Press, 2009.

REFERENCES:

1. Michael C. Daconta, Leo J.Obrst and Kevin T. Smith, ―The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management‖, First Edition, Wiley, 2003

2. Karin Breitman, MarcoAntonio Casanova and Walt Truszkowski, ―Semantic Web: Concepts,TechnologiesandApplications(NASAMonographsinSystemsandSoftware Engineering) Springer, 2010.

3. VipulKashyap,ChristophBusslerandMatthew Moran, The Semantic Web: Semantics forDataandServicesontheWeb(Data-CentricSystemsand Applications),Springer,2008.

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Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

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Computer Science & Engineering					
Code: CS506	**Computer Architecture***	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

***This course open to all branch except CSE/IT.**

Course Outcomes:

1. Ability to describe the organization of computer and machine instructions and programs
2. Ability to analyze Input / Output Organization
3. Analyze the working of the memory system and basic processing unit.
4. Ability to solve problems of multicores, multiprocessors and clusters.
5. Choose optical storage media suitable for multimedia applications.

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO1	-	3	-	2	2	-	-	-	-	-	-	1
CO2	2	2	2	2	2	-	-	-	-	-	-	2
CO3	2	2	2	2	3	-	-	-	-	-	-	2
CO4	3	3	3	2	2	-	-	-	-	-	-	2
Average												

**3: high, 2: moderate, 1 low*

MODULE-I:

Basics of Digital Electronics: Multiplexers and De multiplexers, Decoder andEncoder, Codes, Logic gates, Flip flops, Registers.

Register Transfer and Micro Operations: Bus and Memory Transfer, Logic Micro Operations, Shift Micro Operations, Register transfer and register transfer language, Design of arithmetic logic unit.

MODULE-II:

Basic Computer Organization: Instruction codes, Computer instructions, Timing and Control, Instruction cycle, Memory reference Instruction, Complete computer description, Design of basic computer, Input output and interrupt.

MODULE-III:

Control Unit: Hardwired controls, Micro programmed controls.

Central Processing Unit : Program control, Reduced instruction set computer, Complex instruction set computer, Data Transfer, Manipulation, General register and stack organization, Addressing mode.

MODULE-IV:

Computer Arithmetic: Addition and subtraction algorithm, Multiplication algorithm, Division algorithms.

MODULE-V:

Input-Output Organization: Priority interrupt, Peripheral devices, Input output interface, Data transfer schemes, Program control and interrupts, Direct memory access transfer, Input/output processor.

Memory Unit: High speed memories, Memory hierarchy, Processor Vs Memory speed, Cache memory, Associative memory, Inter leave, Virtual memory, Memory management.

MODULE-VI:

Introduction to Parallel Processing: Pipelining, Characteristics of multiprocessors, Interconnection structures, Inter processor arbitration, Inter processor communication, Synchronization.

Text Books:

1. Computer System Architecture by Morris Mano, Prentice hall, 3rd Edition, (2007)

References:

1. Computer Organization by Carl Hamacher, ZvonkoVranesic, SafwatZaky, Tata Mcgraw Hill, 5th Edition, (2011)
2. Computer Architecture : A Quantitative Approach by Hennessy, J. L, David A Patterson, and Goldberg, Pearson Education, 4th Edition, (2006)

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Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: IT501	**Information System**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes

CO1: Define fundamental concepts of the information system.

CO2: Relate the basic concepts and technologies used in the field of information systems.

CO3: Understand various applications of IS in business environment and management.

CO4: Able todesign and develop information systems.

CO5: Apply and analyze the different security challengesand ethical measures

CO PO mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO1	2	1	-	-	-	-		-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-
CO5	2	2	-	**1**	-	-	-	-	-	-	-	--

Module 1–Introduction to Information systems

Information system, Fundamental roles of IS in business, Trends in information systems, The roles of IS in business, Types of Information systems; Components of Information Systems, Information system resources, information system activities, recognizing information systems; Fundamentals of strategic advantage, Using information technology for strategic advantage.

Module 2: Information Technology

Computer hardware; Computer software: Application software and System software; Data resource management: database management, database structures, data warehouse and data mining; Telecommunication and networks: Networkingthe enterprise, Telecommunication network alternatives; types of telecommunication networks.

Module 3: Business Applications

Enterprise business systems, Enterprise Resource Management, Customer relationship Management, Supply Chain Management, Benefits and challenges; E-Commerce systems, Decision support system, Executive information systems, knowledge management systems,Artificial intelligence technologies in business.

Unit 4: Development Process

System analysis and design, Systems development life cycle, Starting the systems development process, systems analysis, systems design, End User development, Implementation activities, implementation challenges.

Unit 5: Management Challenges

Business/IT security, ethics and society; ethical responsibility of business professionals, Privacy issues, computer crime, tools of security management, internetworked security defenses, security measures, System controls and audits; Managing information technology, Global IT management.

Textbooks:

1. O'Brien J. A. and Marakas G. M., Introduction to Information Systems, 14th Edition, McGraw-Hill Irwin, 2008.

Reference:

1. Kenneth C. Laudon, Jane Price Laudon, "Management Information Systems: Managing the digital firm", Pearson Education, PHI, Asia.
2. "Management Information Systems – The ManagersView", Tata McGraw Hill, 2008. Davis, Gorden B. Olson, M.H,
3. Jawadekar W S, "Management Information Systems", Second Edition, 2002, Tata.
4. "Modern Systems Analysis and Design" Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, Prentice Hall

Computer Science & Engineering					
Code: CS501P	**Computer Organization and Architecture Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of Experiments:

1. To design Half adder and Full adder circuit using Multi-Sim and verify the truth table.
2. To design Half sub-tractor and Full sub-tractor circuit using Multi-Sim and verify the truth table.
3. To construct and verify the operation of Parity Bit Generator and Checker.
4. To construct and verify operation of 4x1, 8x1 Multiplexer.
5. To construct and verify the operation of 3x8 Decoder and 8x3 Encoder.
6. To design 2-bit arithmetic and logic unit and verify the truth table.
7. To design 4-bit universal shift register and verify the truth table.
8. To design the 4-bit ALU and verify the truth table.
9. To generate digital clock signal using 555 Timer.
10. To design 4-bit Binary Up Counter and verify the truth table.
    a. To study Cache Memory.
    b. To study Hardwired Control Unit&Micro-programmed Control Unit.

Computer Science & Engineering					
Code: CS502P	**Compiler Design Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

Listof Experiments

1. To Design a lexical analyzer for given language to recognize a few patterns in C (Ex. identifiers, constants, comments, operators etc.) and the lexical analyzer should ignore redundant spaces, tabs, and new lines.
2. To test whether a given identifier is valid or not.
3. To find out the FIRSTPOS and FOLLOWPOS for a given expression.
4. To implement LL (1) parser.
5. To implement Recursive Descent parser.
6. To implement a Symbol Table.
7. To identify that, for a given set of grammar, whether the string belongs to that grammar or not.

Computer Science & Engineering					
Code: CS503P	**Computer Graphics Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of Experiments:

1. To implement DDA Line Drawing Algorithm.
2. To implement Bresenham's Line Drawing Algorithm.
3. To implement Mid-Point Circle Drawing Algorithm.
4. To implement Mid-Point Ellipse Drawing Algorithm.
5. To implement 2-D Transformation.
6. To implement Boundary Fill Algorithm.
7. To implement Flood Fill Algorithm.
8. To implement Cohen Sutherland Line Clipping Algorithm.
9. To implement Sutherland Hodgeman Polygon Clipping Algorithm.

Computer Science & Engineering					
Code: CS504P	**Linux Programming Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of experiments:

1. Execute various Linux shell commands in bash shell and explore various options and arguments using man page.

2. Shell Script basics

   i. Write a *shell script* that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers
   ii. Write a *shell script* that deletes all lines containing a specified word in one or more files supplied as arguments to it
   iii. Write a *shell script* that displays a list of all files in the current directory to which the user has read, write and execute permissions.
   iv. Write a *shell script* that receives any number of file names as its arguments, checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

v. Write a *shell script* that receives any number of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

vi. Write a *shell script* to list all of the directory files in a directory.

3.

i. Write a *C program* that makes a copy of a file using standard I/O and system calls.

ii. Write a *C program* to emulate the Unix 'ls -l' command.

iii. Write client and server programs (*using C*) for interaction between server and client processes using Unix Domain sockets.

iv. Write a *C program* to list every file in a directory, its inode number and file name.

v. Implement in *C* the following Linux commands using system calls:
(a) cat (b) ls (c) mv

vi. Write a C program to emulate the UNIX ls –l command.

vii. Write a C program to list for every file in a directory, its inode number and file name.

viii. Write a C program that demonstrates redirection of standard output to a file.
Ex: ls> f1.

4. Write a C program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.
5. Write a C program to create a Zombie process and orphan process.
6. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: – ls –l | sort
7. Write C programs that illustrate communication between two unrelated processes using named pipe
8. Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.
9. Write a C program to allow cooperating processes to lock a resource for exclusive use, using a) Semaphores b) flock or lockf system calls.
10. Write a C program that illustrates suspending and resuming processes using signals.
11. Write a C program that implements a producer-consumer system with two processes. (Using Semaphores).
12. Write client and server programs (using c) for interaction between server and client processes using Unix Domain sockets.
13. Write client and server programs (using c) for interaction between server and client processes using Internet Domain sockets.
14. Write a C program that illustrates two processes communicating using shared memory.

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Computer Science & Engineering					
Code: IT501P	**Information System Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of Experiments:

1. Develop a student management system.

- It should contain all the information of University or a school.
- It should contain all the information of University Infrastructure or a school.
- It should contain all the information of University Students.

2. Design a marketing information system with fundamental inputs and outputs

Inputs: 1. Sales on units by each salesman for a period. 2. Estimated sales in units of competitor corresponding to above. 3. Economic conditions and trends.

Outputs: 1. Sales by product i.e. month wise and till date. 2. Sales by salesman i.e. month wise and till date. 3. Sales by trend analysis. 4. Sales forecasting

3. Given a fact table with sales data (for example sales (market#, product#, time#, amount) – see the lecture notes) and relevant dimension tables, write an SQL statement that slices the cube to select sales only in week 2, and dice it by regions.

4. To design a Personal Management Information System using XML to implement E-Commerce Marketing Strategies.

5. To identify top retail web sites and online sales volume of those websites and perform pattern analysis using data mining concepts.

6. To design an online learning database application with DBMS operations, working with tables, queries, forms, reports and data analysis.

7. To develop a transaction processing application to discover or identify similar patterns from transaction data using data mining techniques.

8. Case study 1

9. Case study 2

10. Mini Project

Computer Science & Engineering					
Code: IT502P	**Web Technology Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of Experiments

1. Design a web page using HTML which includes the following:

- To display your education details in a tabular format.
- To illustrate the usage of HTML Lists.
- To embed an image and create a link such that clicking on image takes user to other page.
- To embed an image map in a web page.
- To embed Audio and Video in a web page.

2.Design a static web page using HTML which includes the following:

- To create a frameset having header, navigation and content sections.
- To create frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.

3. Write an HTML program to design an Entry form of student details and send it to store at database server like SQL, Oracle or MS Access.

4. Design a web page using CSS which includes the following:

- Use different font styles.
- Set background image for both the page and single elements on page.
- Control the repetition of image with background-repeat property
- Define style for links as a:link, a:active, a:hover, a:visited
- Add customized cursors for links.
- Work with layers.

5. Write a Java applet program:

- To display moving text or content.
- To draw lines, ovals, and rectangles.
- To display a Digital Clock.
- To select a URL from my Applet and send the browser to that page.

6.Write a JavaScript program:

- To design the scientific calculator and make event for each button.

- To compute the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.

7. Write JavaScript to validate the following fields of the above registration page:

- Name (Name should contains alphabets and the length should not be less than 6 characters).
- Password (Password should not be less than 6 characters length).
- E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com).
- Phone number (Phone number should contain 10 digits only).

8. Write a JavaBeans program to converts value of INR (Indian Rupees) into equivalent American/Canadian/Australian Dollar value.

9. Write a Java servlet programs to conduct online examination and to display student mark list available in a

Database.

10. Write an XML program:

- To display the Book information which includes the following:
- Title of the book
- Author Name
- ISBN number
- Publisher name
- Edition
- Price

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Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Semester – VI

Computer Science & Engineering					
Code: CS601	**Computer Networks**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Course Objective:

This course includes learning about computer network organization and implementation. Students are introduced to computer network design and its operations, and discuss the topics of OSI communication model; error detection and recovery; LANs; network naming and addressing; and basics of cryptography and network security.

Course Outcome:

CO1	Describe and analyze the importance of data communications and the layered protocol model
CO2	Describe, analyze and evaluate a number of data link, network, and transport layer protocols and network devices.
CO3	Have a basic knowledge of the use of cryptography and network security;
CO4	Explain concepts and theories of networking and apply them to various situations, classifying networks, analyzing performance and implementing new technologies

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO1	1	1	-	2	-	-	-	1	1	-	-	2
CO2	2	2	1	1	3	-	-	-	1	-	1	2
CO3	-	1	3	2	-	2	2	3	-	-	-	3
CO4	3	2	2	2	2	-	-	2	1	1	2	2

Course Description:

MODULE 1:

Data communication Components**:** Representation of data and its flow in Networks, Various Connection Topology, Protocols and Standards, OSI model.Physical Layer: LAN technologies (Ethernet), Multiplexing, Transmission Media, Switching Techniques.

MODULE 2:

Data Link Layer: Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, and Sliding Window. Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA. Error Detection and Error Correction - Fundamentals, Block coding, CRC, Hamming Code.

MODULE 3:

Network Layer: Internetworking Devices. IP Addressing and Subnetting, Network Layer Protocols: IPV4, IPV6 and ICMP. Address Mapping: ARP, RARP and DHCP. Routing algorithms (link state and distance vector).

MODULE 4:

Transport Layer: Process to Process Delivery: UDP and TCP, Congestion Control and Quality of Services.

MODULE 5:

Application Layer: Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi.

MODULE 6:

Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

Text Books:

1. "Data Communication and Networking", BehrouzForouzan, McGraw Hill Education.

Reference Books:

1. "Computer Networks", Andrew S Tanenbaum, Pearson Edition
2. "Data and Computer Communications " , W. Stallings, PHI/ Pearson Education

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Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: CS602	**Data Science**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Course Objective:

The main objective of this course is to train the student to do theoretical with practical data science work, Career-wise, we expect our students to be able to develop into skilled data science researchers or software developers.

Course Outcome:

1. To enable students with data analytics skill
2. To develop knowledge of fundamentals of data science
3. To empower students with hands-on for data science
4. To make students experience with theoretical data science and programming

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO5**	**PO9**	**P11**	**P12**
CO1	-	3	2	-	1	3	3
CO2	3	2	-	-	2	2	2
CO3	-	2	3	3	3	3	-
CO4	2	-	2	3	3	2	2

MODULE-I

INTRODUCTION: -

Introduction to data science, Different sectors of using data science, Purpose and components of Python, Data Analytics processes, Exploratory data analytics, Quantitative technique and graphical technique, Data types for plotting.

MODULE-II

STATISTICAL ANALYSIS: -

Introduction to statistics, statistical and non-statistical analysis, major categories of statistics, population and sample, Measure of central tendency and dispersion, Moments, Skewness and kurtosis, Correlation and regression, Theoretical distributions – Binomial, Poisson, Normal

MODULE-III

INTRODUCTION TO MACHINE LEARNING: -

Machine learning, Types of learning, Properties of learning algorithms, Linear regression and regularization, model selection and evaluation, classification: SVM, kNN and decision tree, Ensemble methods: random forest, Naive Bayes and logistic regression, Clustering: k-means, feature engineering and selection, Dimensionality reduction: PCA

MODULE-IV

PYTHON SETUP FOR MATHEMATICAL AND SCIENTIFIC COMPUTING: -

Anaconda installation process, data types with python, basic operators and setup, introduction to numpy, mathematical functions of numpy, introduction to scipy, scipy packages, data frame and data operations, data visualisation using matplotlib

Text Books:

1. N.G.Das , Statistical Methods (combined edition Vol.I and Vol.II) – McGraw Hill
2. Roger D. Peng, Elizabeth Matusi, The Art of Data Science: A Guide for Anyone who work with data - Leanpub
3. AurelienGeron, Hands-On Machine Learning with Scikit – Learn &TensorFlow – O'reilly

Reference Books:

1. AndriyBurkov, The Hundred Page Machine Learning Book – Xpress Publishing
2. James, G., Witten, D., Hastie, T., Tibshirani, R. An introduction to statistical learning with applications in R. Springer.
3. Murphy, K. Machine Learning: A Probabilistic Perspective. - MIT Press
4. Jan Erik Solem, Programming Computer Vision with Python – O' Reilly

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Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: CS603	**Image Processing**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Pre-requisite(s)

Knowledge ofData Structures, Computer Graphics required for this course.

Objectives of the course

Course Outcomes:

After completing this course, students will be able to:

CO1	To study the image fundamentals and image transforms necessary for image processing
CO2	To study the image enhancement techniques.
CO3	To study the image restoration procedures and segmentation tools.
CO4	To study the wavelet tools and the image compression procedures.

Mapping of course outcomes with program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	2	-	-	-	-	-	-	-	-	
CO2	3	2	2	3	-	-	-	-	-	-	-	-
CO3	2	-	3	2	-	-	-	-	-	-	-	-
CO4	1	2	3	-	-	-	-	-	-	-	-	-

MODULE-I:

INTRODUCTION AND DIGITAL IMAGE FUNDAMENTALS

Introduction: Origin, Steps in Digital Image Processing, Components. Digital Image Fundamentals: Elements of Visual Perception, Image Sampling and Quantization, Some Basic Relationships between pixels, Color Models.

MODULE-II:

IMAGE TRANSFORM

Introduction to the Fourier Transform, The Discrete Fourier Transform, Discrete Cosine Transform, Singular Value Decomposition and Principal Component Analysis.

MODULE-III:

IMAGE ENHANCEMENT

Spatial Domain: Some Simple Intensity Transformations, Histogram processing, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering. Frequency Domain: Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

MODULE-IV:

IMAGE RESTORATION AND SEGMENTATION

Image Restoration: Noise models, Mean Filters, Order Statistics, Adaptive filters, Band reject Filters, Band pass Filters, Notch Filters, Optimum Notch Filtering, Inverse Filtering, Wiener filtering. Segmentation: Thresholding.

MODULE-V:

WAVELETS AND IMAGE COMPRESSION

Wavelets: Background, Sub-band Coding, Multi-resolution Expansions. Compression: Fundamentals, Image Compression Models, Error Free compression- Variable Length Coding, Bit-Plane Coding, Lossless Predictive Coding, Lossy Compression, Lossy Predictive Coding, Transform Coding and Wavelet Coding.

TEXT BOOK:

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

REFERENCES:

1. S. Jayaraman, S Essakirajan, “Digital Image Processing”, Second Edition, Tata McGraw Hill, 2009
2. Khalid Sayood, “Introduction to Data Compression”, Third Edition, Elsevier, 2006.
3. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
4. https://cse19-iiith.vlabs.ac.in/index.html

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Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: CS605	**System Software**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Objectives of the course

To introduce the student to key concepts in Phase transformations and enable an understanding of the steps involved in several important phase transformations.

Course Outcomes

After completing this course, the student should be able to:

CO1	Explain the organization of basic computer, its design and the design of control unit.
CO2	Understand the organization of memory and memory management hardware.
CO3	Distinguish between Operating Systems software and Application Systems software.
CO4	Identify the primary functions of an Operating System.
CO5	Master attributes and assessment of quality, reliability and security of software.

Detailed Syllabus:

MODULE-I

INTRODUCTION: System Software, Application Software, components of a programming system: Assembler, Loader, Linker, Macros, Compiler, Program Development Cycle, Evolution of Operating Systems, Functions of Operating System, Machine Structure: General Machine Structure, Approach to a new machine, Memory Registers, Data, Instructions, Evolution of Machine Language: Long Way, No looping, Address Modification, Looping, Introduction to Assembly LanguageProgram.

MODULE –II

ASSEMBLERS: Review of Computer Architecture – Machine Instructions and Programs – Assemblers –Basic Assembler Functions – Assembler Features – Assembler Design Options. LOADERS AND LINKERS: Loaders and Linkers – Basic Loader Functions – Machine-Dependent Loader Features – Machine-Independent Loader Features– Loader Design Options-Dynamic Linking and Loading- Object files- Contents of an object file – designing an object format – Null object formats- Code sections- Relocation – Symbols and Relocation – Relocatablea.out-ELF.

MODULE-III

MACROPROCESSORS AND EMULATORS: Microprocessors – Basic Macro Processor Functions – Machine-Independent Macro Processor Features – Macro Processor Design Options - Introduction to Virtual Machines (VM) - Emulation - basic Interpretation – Threaded Interpretation – Interpreting a complex instruction set – binary translation.

MODULE-IV

VIRTUAL MACHINES: Pascal P-Code VM – Object-Oriented VMs – Java VM Architecture – Common Language Infrastructure – Dynamic Class Loading. ADVANCED FEATURES: Instruction Set Issues – Profiling – Migration – Grids – Code optimizations- Garbage Collection - Examples of real-world implementations of system software.

TEXT BOOKS:

1. Leland L. Beck, “System Software”, 3rd ed., PearsonEducation.
2. John R. Levine, “Linkers & Loaders”, MorganKauffman.
3. James E Smith and Ravi Nair, “Virtual Machines”,Elsevier.

REFERENCES:

1. Srimanta Pal, “ Systems Programming “ , Oxford UniversityPress.
2. John J.Donovan, “ “Systems Programming”, Tata McGraw-Hill.
3. Systems Programming by John J Donovan (McGraw-HillEducation)
4. Operating System and System Programming – Dhamdhere (McGraw-HillEducation)

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: CS606	**Distributed System**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course objective:

This course covers the basic understanding of distributed computing system. The course aims to provide an understanding of the principles on which the Internet and other distributed systems are based; their architecture, algorithms and how they meet the demands of contemporary distributed applications. The course covers the building blocks for a study of distributed systems, and addressing thecharacteristicsandthechallengesthatmustbeaddressedintheirdesign:scalability,heterogeneity, securityandfailurehandlingbeingthemostsignificant.Distributedcomputingisafieldofcomputerscience that studies distributed systems. A distributed system is a system whose components are located on different networked computers, which communicate and coordinate their actions bypassingmessagestooneanother.Thecomponentsinteractwithoneanotherinordertoachieve a common goal. Three significant characteristics of distributed systems are: concurrency of components, lack of a global clock, and independent failure ofcomponents.

Course Outcomes:

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

CO1	Demonstrate knowledge of the basic elements and concepts related to distributedsystem technologies.
CO2	Demonstrate knowledge of the core architectural aspects of distributed systems
CO3	Demonstrate knowledge of details the main underlying components of distributed systems (such as RPC, file systems);
CO4	Use and apply important methods in distributed systems to support scalability and fault tolerance;
CO5	Demonstrate experience in building large-scale distributed applications.

Detailed Syllabus:

MODULE-I.

Introduction to distributed computing system, evolution different models, gaining popularity, definition, issues in design, DCE, message passing –introduction, desirable features of a good message passing

system, issues in IPC, synchronization, buffering, multigram messages, encoding and decoding of message data, process addressing, failure handling, group communication.

MODULE-II.

Introduction, model, transparency, implementation mechanism,stubgeneration, RPC messages, marshalling arguments and results, server management, parameter - passing semantics, call semantics, communication protocols for RPCs, client – server binding, exception handling, security, mini project using Java RMI.

MODULE-III.

General architecture of DSM systems, design and implementation issues of DSM systems, granularity, structure of shared memory space, consistency model, replacement strategy, thrashing, advantages of DSM, clock synchronization DFS and security- Desirable features of good DFS, file models, file accessing Models, file sharing semantics, file catching schemes, file replication, fault Tolerance, atomic transaction, potential attacks to computer system, cryptography, authentication, access control.Digital signatures, DCE securityservice.

MODULE-IV.

Operating Systems, Client-Server Model, Distributed Database Systems, Parallel Programming Languages and Algorithms. Distributed Network Architectures- Managing Distributed Systems. Design Considerations.

MODULE-V.

For development, implementation & evaluation of distributed information systems, workflow, software processes, transaction management, and data modeling, infrastructure e.g. middle-ware to glue heterogeneous, autonomous, and partly mobile/distributed data systems, such as e.g. client/server-, CORBA-, and Internet- technologies. Methods for building distributed applications.

Text / Reference

1. Pradeep K. Sinha, "Distributed Operating Systems: Concepts Design", 2007
2. Crichlow Joel M, "An Introduction to Distributed and Parallel Computing", PHI, 1997
3. Black Uyless, "Data Communications and Distributed Networks", PHI, 5thEdition,1997

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: CS608	**Software Engineering**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course objectives –

1. To develop basic Knowledge in Software Engineering and its applications.

2. To understand software Engineering layered architecture and the process frame work.

3. To analyze software process models such as the waterfall, spiral, evolutionary models and agile method for software development.

4. To design software requirements and specifications of documents.

5. To understand project planning, scheduling, cost estimation, risk management.

6. To describe data models, object models, context models and behavioral models.

7. To learn coding style and testing issues.

8. To know about the quality checking mechanism for software process and product.

Course outcomes –

CO.1 Identifythe principles of large scale software systems, and the processes that are used to build them.

CO.2 Ableto use tools and techniques for producing application software solutions from informal and semi-formal problem specifications.

CO.3 Develop an appreciation of the cost, quality, and management issues involved in software construction.

CO.4 Implement design and communicate ideas about software system solutions at different levels.

CO.5 Establish the relation with other people in a team, communicating computing ideas effectively in speech and in writing.

Mapping of course outcomes with program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO.1	2	2	-	3	-	-	-	-	-	-	-	1
CO.2	-	3	-	2	1	-	-	-	-	-	-	-
CO.3	-	3	3	-	-	-	-	-	-	-	-	-
CO.4	1	2	-	1	-	-	-	-	-	1	-	-
CO.5	-	-	-	-	-	1	-	1	1	1	2	3

MODULE-I:

INTRODUCTION TO SOFTWARE PROCESS

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Introduction to Agility-Agile process-Extreme programming (XP) Process.

MODULE-II:

REQUIREMENTS ANALYSIS AND SPECIFICATION

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

MODULE-III:

SOFTWARE DESIGN

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

MODULE-IV:

TESTING AND MAINTENANCE

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging –Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

MODULE-V:

PROJECT MANAGEMENT

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

TEXT BOOKS:

1. Roger S. Pressman, ―Software Engineering – A Practitioner's Approach‖, Seventh Edition, McGraw-Hill International Edition, 2010.

2. Rajib Mall, ―Fundamentals of Software Engineering‖, Third Edition, PHI Learning PrivateLimited, 2009.

REFERENCE BOOKS:

1. Ian Sommerville, ―Software Engineering‖, 9th Edition, Pearson Education Asia, 2011.

2. PankajJalote, ―Software Engineering, A Precise Approach‖, Wiley India, 2010.

3. Kelkar S.A., ―Software Engineering‖, Prentice Hall of India Pvt Ltd, 2007.

4. Stephen R.Schach, ―Software Engineering‖, Tata McGraw-Hill Publishing Company Limited,2007.

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: CS609	**Artificial Intelligence & Machine Learning**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course objectives -

The aim of Artificial Intelligence & Machine Learning course is to prepare students for career in computer science & engineering where knowledge of AI & ML techniques leading to the advancement of research and technology. Artificial Intelligence and Machine Learning are the terms of computer science. Machine Learning is the learning in which machine can learn by its ownwithoutbeingexplicitlyprogrammed.ItisanapplicationofAIthatprovidesystemtheability to automatically learn and improve fromexperience.

Course Outcomes: After completing this course the student will be able to:

CO1	Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3	Demonstrate proficiency in applying scientific method to models of machine learning.
CO4	Discuss the basics of ANN and different optimizations techniques.

Mapping of course outcomes with program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	2	-	-	-	-	-	-	-
CO2	2	-	3	2	-	-	-	-	-	-	-	-
CO3	3	2	-	3	-	-	-	-	-	-	-	-
CO4	2	-	1	-	3	-	2	-	-	-	-	-

Course Detail -

MODULE-I:

Overview and Search Techniques: Introduction to AI, Problem Solving, Statespacesearch,Blindsearch:Depthfirstsearch, Breadthfirstsearch,Informedsearch: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

MODULE-II:

Knowledge Representation (KR): Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining, resolution;Propositionalknowledge,Booleancircuitagents;RuleBasedSystems,Forward reasoning: Conflict resolution, backward reasoning: Structured KR: Semantic Net - slots, inheritance, ConceptualDependency.

MODULE-III:

Handling uncertainty and Learning: Source of uncertainty, Probabilistic inference,Bayes'theorem,LimitationofnaïveBayesiansystem,BayesianBeliefNetwork (BBN); Machine learning, Basic principal, Utility of ML Well defined learning system, Challenges in ML, Application of ML.

MODULE-IV:

Learning and Classifier: Linear Regression (with one variable and multiple variables), Decision Trees and issue in decision tree, Clustering (K-means, Hierarchical, etc), Dimensionality reduction, Principal Component Analysis, Anomaly detection, Feasibility of learning, Reinforcement learning.

MODULE-V:

Artificial Neural Networks: Introduction, Artificial Perceptron's, Gradient Descent and The Delta Rule, Adaline, Multilayer Networks, Back-propagation Rule back-propagation Algorithm-Convergence; Evolutionary algorithm, Genetic Algorithms – An Illustrative Example, Hypothesis Space Search, Swarm intelligence algorithm.

Text Book:

1. Artificial Intelligence by Elaine Rich and Kevin Knight, Tata MeGrawHill
2. Understanding Machine Learning. ShaiShalev-Shwartz and Shai Ben-David.CambridgeUniversityPress.
3. Artificial Neural Network, B. Yegnanarayana, PHI,2005

Reference Book:

1. Christopher M. Bishop. Pattern Recognition and Machine Learning(Springer)
2. IntroductiontoArtificialIntelligenceandExpertSystemsbyDanW.Patterson,Prentice Hall ofIndia

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

Syllabus for B. Tech course in Computer Science & Engineering and Information Technology

Computer Science & Engineering					
Code: CS604	**Soft Computing**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course objective:

This course will cover fundamental concepts used in Soft computing. Soft Computing refers to a partnership of computational techniques in computer science, artificial intelligence, machine learning and some engineering disciplines, which attempt to study, model, and analyze complex phenomena.TheconceptsofArtificialNeuralNetworks(ANNs)willbecoveredfirst,followedby Fuzzylogic(FL)andoptimizationtechniquesusingGeneticAlgorithm(GA).ApplicationsofSoft Computing techniques to solve a number of real-life problems will be covered to have hands on practices.Insummary,thiscoursewillprovideexposuretotheoryaswellaspracticalsystemsand software used in softcomputing.

Course outcomes:

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

CO1	**Present** the feasibility of applying a soft computing methodology for specific problem.
CO2	**Identify** and describe soft computing techniques and their roles in building intelligent machines.
CO3	**Apply** neural networks to pattern classification and regression problems.
CO4	**Apply** fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
CO5	**Apply** genetic algorithms to combinatorial optimization problems.

Mapping of course outcomes with program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO 1	3	3	3	2	3	-	-	-	-	1	-	2
CO 2	3	3	2	2	-	-	-	-	2	-	-	-
CO 3	3	2	2	2	2	-	-	-	-	-	-	2
CO 4	3	3	2	2	2	-	-	-	-	-	-	-
CO 5	3	2	2	2	2	-	-	-	-	-	-	2
Avg	3	2.6	2.2	2	2.25				2	1		2

Detailed Syllabus

MODULE-I:

INTRODUCTION TO SOFT COMPUTING: Soft computing: Softcomputing concepts, soft computing versus hard computing, various types of soft computing techniques, applications of soft computing.

MODULE-II:

ARTIFICIAL NEURAL NETWORKS: Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training, Algorithms-perceptions; Training rules, Delta, Back Propagation Algorithm, Multilayer PerceptronModel.

MODULE-III:

SPECIAL LEARNING NETWORK: Competitive learning networks, Kohonen Self-organizing networks, Hebbian learning, Hopfield Networks, Associative memories, The Boltzman machine**,** Applications of Artificial Neural Networks.

MODULE-IV:

FUZZY LOGIC: Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Qualifiers, Linguistic Hedges, Introduction & features of membership functions.

MODULE-V:

FUZZY RULE BASED SYSTEM: Fuzzy rule base system: Fuzzy Propositions, implications and inferences, Fuzzy reasoning, Defuzzification techniques, Fuzzy logic controller design, Fuzzy decision making & Applications of fuzzy logic.

MODULE-VI:

GENETIC ALGORITHMS: Genetic Algorithms: An Overview of Genetic algorithm (GA), Evolution strategies (ES), Evolutionary programming (EP), Genetic programming (GP); GA operators: Encoding, Selection, Crossover, Mutation, schemaanalysis,analysisofselectionalgorithms;convergence;optimization,oftravelling salesman problem using genetic algorithm approach; Markov & other stochastic models. Other Soft Computing Techniques: Simulated annealing, Tabu search, Ant colony-based optimization (ACO),etc.

Text Book:

1. P. R. Beeley, Foundry Technology, Newnes-Buttterworths,2001.

2. P. D. Webster, Fundamentals of Foundry Technology, Portwillis press, Red hill,1980.
SupplementaryReading:
1. P. C. Mukherjee, Fundamentals of Metal casting Technology, Oxford IBH,1980.
2.R. W. Hein, C. R. Loper and P. C. Rosenthal, Principles of Metal casting, McGraw Hill,1976.

Computer Science & Engineering					
Code: IT601	**Information Retrieval**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES: To provide an overview of Information Retrieval systems. Expose them to various retrieval models with emphasis on pros and cons of these models. Discuss mechanisms of web search along with the details of ranking algorithms. Introduce basic concepts of text categorization and recommender systems.

MODULE-I

Introduction to Information Retrieval: The nature of unstructured and semi-structured text. Inverted index and Boolean queries. Text Indexing, Storage and Compression Text encoding: tokenization; stemming; stop words; phrases; index optimization. Index compression: lexicon compression and postings lists compression. Gap encoding, gamma codes, Zipf's Law. Index construction. Postings size estimation, dynamic indexing, positional indexes, n-gram indexes, real-world issues.

MODULE -II

Information Retrieval Models: Boolean; vector space; TFIDF; Okapi; probabilistic; language modeling; latent semantic indexing. Vector space scoring. The cosine measure. Efficiency considerations. Document length normalization. Relevance feedback and query expansion. Rocchio algorithm.

MODULE -III

Web Information Retrieval: Hypertext, web crawling, search engines, ranking, link analysis, PageRank, HITS. Retrieving Structured Documents: XML retrieval, semantic web.

Performance Evaluation of IR systems: Evaluating search engines. User happiness, precision, recall, F-measure. Creating test collections: kappa measure, interjudge agreement.

MODULE -IV

Text Categorization and Filtering: Introduction to text classification. Naive Bayes models. Spam filtering. Vector space classification using hyperplanes; centroids; k Nearest Neighbors. Support vector machine classifiers. Kernel functions. Boosting.

MODULE -V

Advanced Topics: Summarization, Topic detection and tracking, Personalization, Question answering, Cross language information retrieval (CLIR). Recommender System.

COURSE OUTCOMES:

Students will get:

CO1: The understanding of different Information retrieval models

CO2: To know about evaluation methods of the information retrieval model

CO3: Exposures of implementing retrieval models on text data

CO4: To know about text categorization and its implementation

CO5: To know the challenges associated with each topics on new domain of retrieval and classification

CO-PO mapping table

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	2			
CO2		1	2	3	
CO3			3	2	2
CO4	3	2	3		
CO5			2	3	

TEXT BOOKS:

1. Manning, Raghavan and Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2009.
2. Baeza-Yates and Ribeiro-Neto, "Modern Information Retrieval", Addison Wesley.

REFERENCES:

1. Charles L. A. Clarke, Gordon Cormack, and Stefan Büttcher, "Information Retrieval: Implementing and Evaluating Search Engines", MIT Press Cambridge, 2010.
2. Baeza-Yates / Ribeiro-Neto, "Modern Information Retrieval: The Concepts and Technology behind Search", Pearson Education India, 2010.

Computer Science & Engineering					
Code: CS607	**Natural Language Processing**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES: To provide an overview of Information Retrieval systems. Expose them to various retrieval models with emphasis on pros and cons of these models. Discuss mechanisms of web search along with the details of ranking algorithms. Introduce basic concepts of text categorization and recommender systems.

MODULE-I

Introduction to Information Retrieval: The nature of unstructured and semi-structured text. Inverted index and Boolean queries. Text Indexing, Storage and Compression Text encoding: tokenization; stemming; stop words; phrases; index optimization. Index compression: lexicon compression and postings lists compression. Gap

encoding, gamma codes, Zipf's Law. Index construction. Postings size estimation, dynamic indexing, positional indexes, n-gram indexes, real-world issues.

MODULE -II

Information Retrieval Models: Boolean; vector space; TFIDF; Okapi; probabilistic; language modeling; latent semantic indexing. Vector space scoring. The cosine measure. Efficiency considerations. Document length normalization. Relevance feedback and query expansion. Rocchio algorithm.

MODULE -III

Web Information Retrieval: Hypertext, web crawling, search engines, ranking, link analysis, PageRank, HITS. Retrieving Structured Documents: XML retrieval, semantic web.

Performance Evaluation of IR systems: Evaluating search engines. User happiness, precision, recall, F-measure. Creating test collections: kappa measure, interjudge agreement.

MODULE -IV

Text Categorization and Filtering: Introduction to text classification. Naive Bayes models. Spam filtering. Vector space classification using hyperplanes; centroids; k Nearest Neighbors. Support vector machine classifiers. Kernel functions. Boosting.

MODULE -V

Advanced Topics: Summarization, Topic detection and tracking, Personalization, Question answering, Cross language information retrieval (CLIR). Recommender System.

COURSE OUTCOMES:

Students will get:

CO1: The understanding of different Information retrieval models

CO2: To know about evaluation methods of the information retrieval model

CO3: Exposures of implementing retrieval models on text data

CO4: To know about text categorization and its implementation

CO5: To know the challenges associated with each topics on new domain of retrieval and classification

CO-PO mapping table

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	-	-	-
CO2	-	1	2	3	-
CO3	-	-	3	2	2
CO4	3	2	3	-	-
CO5	-	-	2	3	-

TEXT BOOKS:

3. Manning, Raghavan and Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2009.
4. Baeza-Yates and Ribeiro-Neto, "Modern Information Retrieval", Addison Wesley.

REFERENCES:

3. Charles L. A. Clarke, Gordon Cormack, and Stefan Büttcher, "Information Retrieval: Implementing and Evaluating Search Engines", MIT Press Cambridge, 2010.
4. Baeza-Yates / Ribeiro-Neto, "Modern Information Retrieval: The Concepts and Technology behind Search", Pearson Education India, 2010.

Computer Science & Engineering					
Code: IT602	**Internet of Things**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Module I

Introduction

Overview and Motivations, IPv6 Role, IoT Definitions, IoT Frameworks. .

Module II

Prototyping Embedded Devices

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, BeagleBone Black, Electric Imp, Other Notable Platforms

Module III

IPv6 Technologies for the IoT

Overview and Motivations, Address Capabilities, IPv6 Protocol Overview, IPv6 Tunnelling, IPsec in IPv6, Header Compression Schemes, Quality of Service in IPv6,Migration Strategies to IPv6

Module IV

Evolving IoT Standards

Overview and Approaches, IETF IPv6 Routing Protocol for RPL Roll, Constrained Application Protocol (CoAP) , Representational State Transfer (REST) , ETSI M2M , Third-Generation Partnership Project Service

Requirements for Machine-Type Communications , CENELEC, IETF IPv6 Over Lowpower WPAN (6LoWPAN) , ZigBee IP (ZIP), IP in Smart Objects (IPSO)

Module V

Prototyping Online Components

Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols: MQTT, Extensible Messaging and Presence Protocol

Module VI

IoT Application Examples

Overview, Smart Metering/Advanced Metering Infrastructure, e-Health/Body Area Networks, City

Automation, Automotive Applications, Home Automation, Smart Cards, Tracking (Following and Monitoring Mobile Objects),Over-The-Air-Passive Surveillance/Ring of Steel, Control Application Examples, Myriad Other Applications

Textbooks:

1. Building the Internet of Things with IPv6 AND MIPv6 by DANIEL MINOLI Published by John Wiley & Sons, Inc., Hoboken, New Jersey.(UNIT-I, III, V, VI)
2. Designing the Internet of Things by Adrian McEwen and Hakim Cassimally Published by John Wiley & Sons (UNIT-II, IV)

References:

1. Getting Started with the Internet of Things by CunoPfister Published by O'Reilly Media, Inc.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things" Key

Course Outcomes:

After completion of course students will be able to

COs	**COs in detail**
CO1	Explain the concept of IoT
CO2	Illustrate key technology, protocols and standard of IoT
CO3	Analyse trade-off in interconnected wireless embedded device networks
CO4	Understand application of IoT in automation of commercial and real world example
CO5	Design a simple IoT System comprising sensors, edge devices and wireless network involving prototyping, programming and data analytics

CO-PO mapping

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**
CO2	**3**	**_**	**1**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**
CO3	**2**	**_**	**1**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**
CO4	**3**	**_**	**2**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**
CO5	**3**	**_**	**2**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**_**

Computer Science & Engineering					
Code: CS601P	**Computer Networks Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of Experiments:

1. Study of Network Devices in detail and to connect the computers in Local Area Network.
2. Study of IP and to Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP Configuration).
3. Study of different types of Network cables and to implement the cross-wired cable and straight through cable in a network.
4. Implementation of basic network command and Network configuration commands.
5. Performing an Initial Switch Configuration.
6. Performing an Initial Router Configuration.
7. Configuring and Examining Network Address Translation (NAT).
8. Configuring Ethernet and Serial Interfaces.
9. Configuring Routing Information Protocol (RIP).
10. Configuring a Cisco Router as a DHCP Server.

Computer Science & Engineering					
Code: CS602P	**Data Science Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of Experiments:

1. Basic Python or R programming
   a. Program to add two numbers
   b. Maximum of two numbers
   c. Program for factorial of a number
   d. Program to check Armstrong number
2. Array Programming
   a. Program to find sum of array
   b. Program to reverse an array
   c. Program to find largest element of an array
3. List programming
   a. Program to swap two elements in a list
   b. Program to find sum of numbers in a list
   c. Program to find even numbers in a list

d. Program to do cumulative sum of a list
4. Matrix program
   a. Program to add two matrices
   b. Program to multiply two matrices
   c. Program to find transpose of matrix
   d. Program to subtract matrices
5. Dictionary program
   a. Program to find sum of all items in a dictionary
   b. Program to merge two dictionary
   c. Program to remove all duplicate words in a sentence
6. Tuple program
   a. Program to find the size of tuple
   b. Program to find Maximum and minimum element in tuple
   c. Program to extract digits from a tuple list
   d. Program to remove tuple of K-length
7. Searching and sorting program
   a. Program for insertion sort
   b. Program Merge sort
   c. Program for Bubble sort
   d. Program for Quick sort
8. File handling program
   a. Program to read file one by one
   b. Program to remove lines starting with any prefix
   c. Program to merge two file to a third file
9. Use Data sets for analysis
   a. Use Iris Data set to perform PCA and do your analysis on different flowers with different sepal and petal length & width.
   b. Use Titanic Data set to find any analysis on death rate with gender and age
   c. Use House price data set to do house price prediction
10. Use Image/text data set for analysis
   a. Use Lungs image data for segmentation
   b. Use any image data set you want to go for feature extraction and dimensionality reduction.
   c. Document classification on any available dataset

Computer Science & Engineering					
Code: CS603P	**Image Processing Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of Experiments

1. Distance and Connectivity
2. Image Arithmetic
3. Affine Transformation
4. Point Operations
5. Neighborhood Operations
6. Image Histogram
7. Fourier Transform

8. Color Image Processing
9. Morphological Operations
10. Image Segmentation
11. Image Processing Test Bench

Computer Science & Engineering					
Code: CS604P	**Soft Computing Lab**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

List of Experiments:

1. To perform Union, Intersection and Complement operations in Fuzzy Logic.
2. To implement De-Morgan's Law.
3. To plot various Membership Functions in Fuzzy Logic.
4. Implementation of Fuzzy Relations using Max-Min Composition method.
5. Implementation of Fuzzy Controller using FIS (Washing Machine).
6. To generate Activation Functions that are being used in Neural Networks.
7. To generate the output of ANDNOT function using McCulloch-Pitts Neural Network.
8. To generate the output of XOR function using McCulloch-Pitts Neural Network.
9. To classify two-dimensional input patterns inbipolar with given targets using Hebb Net.

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