JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

Course Structure for 5th and 6th Semester CSE

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

5th Sem CSE

Sl. No	Course Code	Category	Subject	L	T	P	Credit
1		Professional Core-I	Computer Organization and Architecture	4	1	0	4
2		Professional Core-II	Compiler Design	3	1	0	3
3		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		Laboratory-I	Computer Organization and Architecture Lab.	0	0	3	1
2		Laboratory-II	Compiler Design Lab.	0	0	3	1
3		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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

List of Electives 5th Semester CSE

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

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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

6th Semester, CSE

S. No	Course Code	Category	Subject	L	T	P	Credit
1		Professional Core-I	Computer Networks	4	1	0	4
2		Professional Core-II	Software Engineering	3	1	0	3
3		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		Laboratory-I	Computer Networks Lab.	0	0	3	1
2		Laboratory-II	Software Engineering Lab.	0	0	3	1
3		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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

List of Electives 6th Semester, CSE

Professional Elective-II	
Course No.	Subject Name
	Soft Computing
	System Software
	Distributed System
	Natural Language Processing
Open Elective-II	
Course No.	Subject Name
	Information Retrieval
	AI and Machine Learning*
	Computer Network*
	Internet Of Things (IOT)

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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

Course Structure for 5th and 6th Semester IT

5th Semester, IT

Sl. No	Course Code	Category	Subject	L	T	P	Credit
1		Professional Core-I	Computer Organization and Architecture	4	1	0	4
2		Professional Core-II	Information System	3	1	0	3
3		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		Laboratory-I	Computer Organization and Architecture Lab.	0	0	3	1
2		Laboratory-II	Information System Lab.	0	0	3	1
3		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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

5th Semester, electives list IT

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

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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

6th Semester, IT

S. No	Course Code	Category	Subject	L	T	P	Credit
1		Professional Core-I	Computer Networks	4	1	0	4
2		Professional Core-II	Software Engineering	3	1	0	3
3		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		Laboratory-I	Computer Networks Lab.	0	0	3	1
2		Laboratory-II	Software Engineering Lab.	0	0	3	1
3		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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

6th Semester, elective list IT

Professional Elective-II	
Course No.	Subject Name
	Soft Computing
	System Software
	Distributed System
	Natural Language Processing
Open Elective-II	
Course No.	Subject Name
	Information Retrieval
	AI and Machine Learning*
	Computer Network*
	Internet Of Things (IOT)

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

Detailed Syllabus

Computer Science & Engineering					
Code: CS	**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: CS	**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 **14 lectures**

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 **4 lectures**

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

MODULE-III:

Compiler Parser **8 lectures**

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 **8 lectures**

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 **4 lectures**

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 **4 lectures**

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*

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

Computer Science & Engineering					
Code: CS	**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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

Computer Science & Engineering					
Code: CS	**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 Java script; 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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

Computer Science & Engineering					
Code: CS	**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 Sed - Scripts, Operations, Addresses, Commands,,awk - Execution, Fields and Records, Scripts, Operations, Actions, Assocoative Array, Strings and Mathematical functions, System commands in awk, Applications. 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, directorycontents, 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, and 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-creationIPC 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.

EXT BOOKS:-

1. Unix System Programming using C++, T. Chan, PHI,(UNIT III to UNIT VIII)
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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

Computer Science & Engineering					
Code: CS	**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.

Computer Science & Engineering					
Code: IT522	**Semantic 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 – the Semantic Web Architecture and Technologies – Contrasting Semantic with Conventional Technologies– Semantic Modeling -Potential of Semantic Web Solutions and Challenges of Adoption Design Principles.

MODULE-2:

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 – Versioning Ontologies 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 –Inferencing RDFS – basic Idea – Classes – Properties- Utility Properties – RDFS Modelling for Combinations 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 Allemangand James Hendler, 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, Marco Antonio Casanova and Walt Truszkowski, ―Semantic Web: Concepts,TechnologiesandApplications(NASAMonographsinSystemsandSoftware Engineering) Springer, 2010.

3. Vipul Kashyap, Christoph Bussler and Matthew Moran, The Semantic Web: Semantics for Data and Services on the Web(Data-Centric Systems and Applications), Springer, 2008.

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

Computer Science & Engineering					
Code: CS532	**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)

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

---

Semester – VI

Computer Science & Engineering					
Code: CS	**Computer Network**	**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", Behrouz Forouzan, McGraw Hill Education.

Reference Books:

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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

Computer Science & Engineering					
Code: IT	**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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

Computer Science & Engineering					
Code: CS	**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

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

Computer Science & Engineering					
Code:	**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:	**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:	**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:

SOFTWARE PROCESS AND AGILE DEVELOPMENT

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.

Computer Science & Engineering					
Code:	**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:	**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, Limitation of naïve Bayesian system, Bayesian Belief Network (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. Cambridge University Press.
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 :	**Internetworking**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Outcomes:

CO 1: Students will be able to classify the routing protocols and analyse how to assign the IP addresses for the given network.
CO 2: Students will be able to understand the architecture of different internet servers.
CO 3: Students will be able to configure the firewall in the network.

CO-PO Mapping:

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

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

MODULE-I:

AN OVERVIEW ON INTERNET

The need for an Internet, The TCP/IP Internet, Internet services, Internet protocols and standardization, Review of Networktechnologies.

INTERNETWORKING CONCEPTS

Architectural model introduction, Application level interconnection, Network level interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Gateways or routers, Internet andIntranet.

MODULE-II:

INTERNET ADDRESS

Introduction, Universal identifiers, Three primary classes of IP addresses, Classless IP address, Network and Broadcast addresses, Mapping internet addresses to physical addresses (ARP), ARP protocol format, Transport Gateways and subnet addressing, Multicastaddressing.

MODULE-III:

INTERNET PROTOCOL

Internet Architecture and Philosophy, The concept of unreliable delivery, Connectionless delivery system, The Internet Datagram, Routing direct and indirect delivery, Table driven IP routing, Protocol layering, Reliable stream transport, TCP performance, Bootstrap protocol(BOOTP).

MODULE-IV:

ROUTING

The origin of Gateway routing tables, Original Internet Architecture and Cores, Core Gateways, Automatic route propagation, Vector distance (Bellman-Ford), routing, Gateway to Gateway Protocol (GGP), Autonomous system concept, Exterior Gateway Protocol (EGP), Interior Gateway Protocol (RIP, OSPF, HELLO), Routing Information Protocol (RIP), Combining RIP, HELLO, and EGP, Routing with partial information.

MODULE-V:

ENTERPRISE NETWORKING AND INTERNET SERVERS

Corporate networking, Broadband at the Metropolitan area level, High speed dedicated WAN services and switched WAN services, ISDN, BISDN and ATM services, Frame relay technology and services, Virtual private network concepts PPTP protocol. DNS, DHCP Servers, FTP, TELNET, E-Mail.

MODULE-VI:

FIREWALL & NETWORKING

Introduction, Implementation of Firewall, Activities of Firewall, Configuration of firewall, Firewalls & SSL, SSL implementation, Bit implementation of SSL, Use ofSSL.

REFERENCE BOOKS

1. Computer Networks and Internets - Douglas E. Comer;PE.
2. Communication Networks - Leon-Garcia-Widjaja;TMH.
3. Internet working withTCP/IP -Douglas E.Comer;PE.
4. TCP/IP protocol suite- ForouzanBehrouz A;TMH.
5. Computer Networks – Andrew S. Tanenbaum;PHI.
6. Data and Computer Communication - William Stallings; PHI.
7. The Complete reference of Networking -CraigZacker;TMH.
8.

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

Computer Science & Engineering					
Code:	**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. The concepts of Artificial Neural Networks (ANNs) will be covered first, followed by Fuzzy logic (FL) and optimization techniques using Genetic Algorithm (GA). Applications of Soft Computing techniques to solve a number of real-life problems will be covered to have hands on practices. In summary, this course will provide exposure to theory as well as practical systems and software used in soft computing.

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: Soft computing 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, schema analysis, analysis of selection algorithms; convergence; optimization, of travelling 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:	**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.

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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

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

Objectives of the course:

The aim this course to understand the basics and importance of cloud computing. Cloud computing is a general term for anything that involves delivering hosted services over the Internet. These services are broadly divided into different categories: Infrastructure-as-a-Service (IaaS), Platform- as-a-Service (PaaS) and Software-as-a-Service (SaaS). The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flowcharts and diagrams. Cloud computing is the on-demand availability of computer system resources, especially datastorageandcomputingpower,withoutdirectactivemanagementbytheuser.Thetermisgenerally used to describe data centers available to many users over the Internet. Large clouds, predominant today, often have functions distributed over multiple locations from central servers.

Course Outcomes:

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

CO1	To identify the appropriate cloud services for a given application and perform cloud- oriented analysis.
CO2	To design the composition of a cloud services.
CO3	To analyze authentication, confidentiality and privacy issues in Cloud computing environment.
CO4	To Determine financial and technological implications for selecting cloud computing platforms.

Mapping of course outcomes with program outcomes:

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

Detailed syllabus:

MODULE – I:

Introduction to cloud computing: Emergence of cloud computing in distributed computing; Cloud computing Definition, Architecture, Cloud-Based Services, Benefits of using a Cloud Model, Key Characteristics of Cloud Computing, Understanding- Public & Private cloud environments, The Evolution of CloudComputing – Hardware & Internet Software Evolution, SPI framework.

MODULE – II:

Cloud services: Communication-as-a-Service (CAAS), Infrastructure-as- a-Service (IAAS), Monitoring-as-a Service (MAAS), Platform-as-a-Service (PAAS), Software-as-a-Service (SAAS).

MODULE – III:

Cloud security challenges: Security Management People, Security Governance, Security Portfolio Management, Security Architecture Design, Identity Access Management (IAM), Data Security. Cloud computing threats, Case studies- Amazon EC2, Google App engine, IBM clouds.

MODULE – IV:

The MSP Model: Evolution from the MSP Model to Cloud Computing and Software-as-a-Service, The Cloud Data Center, Basic Approach to a Data Center-Based SOA, Open Source Software, Service- Oriented Architectures as a Step Toward Cloud Computing.

MODULE – I:

Virtualization concepts & Smartphone: virtualization benefits,Hardware & Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization, Network Virtualization, Virtualization Security Recommendations, Introduction to Various Virtualization OS VMware, KVM, Virtual Machine Security, Smartphone, Mobile Operating Systems for Smartphone's (iPhone, Windows Mobile), Google(Android).

Course outcomes:

At the end of this course

1. Student will be able to identify the appropriate cloud services for a given application and perform cloud-oriented analysis.
2. Students will be able to design the composition of a cloud services.
3. Student will be able to analyze authentication, confidentiality and privacy issues in Cloud computing environment.
4. Determine financial and technological implications for selecting cloud computing platforms.

Text Book:

1. Toby Velte, Anthony Vote and Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw Hill, 2002
2. Gautam Shroff, Enterprise Cloud Computing, Cambridge,2010.

Reference Book:

1. Tim Matherm, Subra Kumara swamy and ShahedLatif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'Reilly Media, 2005.
2. Ronald Krutz and Russell Dean Vines, Cloud Security, 1st Edition, Wiley

JHARKAHAND UNIVERSITY OF TECHNOLOGY, RANCHI

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