

Scheme & Syllabus of
Bachelor of Technology
Computer Science & Engineering

Batch 2018 onwards

Fifth Semester

Course Code	Type of Course	Course Title	Hours per Week			Marks Distribution		Total Marks	Credits
			L	T	P	Internal	External		
BTES 501-18	Engineering Science	Enterprise Resource Planning	3	0	0	40	60	100	3
BTCS 501-18	Professional Core Courses	Database Management Systems	3	0	0	40	60	100	3
BTCS 502-18	Professional Core Courses	Formal Language & Automata Theory	3	0	0	40	60	100	3
BTCS 503-18	Professional Core Courses	Software Engineering	3	0	0	40	60	100	3
BTCS 504-18	Professional Core Courses	Computer Networks	3	0	0	40	60	100	3
BTCS 520-18	Professional Elective	Web Technologies (Elective-I)	3	0	0	40	60	100	3
MC	Mandatory Courses	Constitution of India/ Essence of Indian Traditional Knowledge	2	-	-	100	-	100	S/US
BTCS 505-18	Professional Core Courses	Database Management Systems Lab	0	0	4	30	20	50	2
BTCS 506-18	Professional Core Courses	Software Engineering Lab	0	0	2	30	20	50	1
BTCS 507-18	Professional Core Courses	Computer Networks Lab	0	0	2	30	20	50	1
BTCS 522-18	Professional Elective	Web Technologies Lab (Elective-I Lab)	0	0	2	30	20	50	1
	Professional Training	Industrial *Training	-	-	-	60	40	100	S/US
Total			20	0	10	520	480	1000	23

* 4-6 weeks industrial training undertaken after 4th semester in summer vacations.

BTES501-18	Enterprise Resource Planning	3L:0T:0P	3 Credits
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Course Details:

UNIT 1 INTRODUCTION

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM [9hrs., CO1]

UNIT II ERP IMPLEMENTATION

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring [9hrs., CO2]

UNIT III THE BUSINESS MODULES

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution [9hrs., CO3]

UNIT IV THE ERP MARKET

ERP Market Place, SAP AG, Peoplesoft, Baan, JD Edwards, Oracle, QAD, SSA [9hrs., CO4]

UNIT V ERP – PRESENT AND FUTURE

Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions [6hrs., CO1]

TEXT BOOK

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000

REFERENCES

1. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001.
2. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI, New Delhi, 2003

Course outcomes: The students at the end will be able;

CO1: To know the basics of ERP

CO2: To understand the key implementation issues of ERP

CO3: To know the business modules of ERP

CO4: To be aware of some popular products in the area of ERP

Course Code: BTCS501-18	Course Title: Database Management Systems	3L:0T:0P	3Credits
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Detailed Contents:

Module 1: Database system architecture

Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and objectoriented Data models, integrity constraints, data manipulation operations.

[7hrs] (CO1,2)

Module 2: Relational query languages

Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

[10hrs] (CO2,4)

Module 3:

Storage strategies, Indices, B-trees, hashing.

[3hrs] (CO3)

Module 4: Transaction processing

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

[6hrs] (CO3)

Module 5: Database Security

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

[8hrs] (CO 4,5)

Module 6: Advanced Topics

Object oriented and object relational databases, Logical databases, Web databases, Distributed databases.

[8hrs] (CO 5)

Course Outcomes:

At the end of study the student shall be able to:

CO1: write relational algebra expressions for a query and optimize the Developed expressions

CO2: design the databases using ER method and normalization.

CO3: construct the SQL queries for Open source and Commercial DBMS-MYSQL, ORACLE, and DB2.

CO4: determine the transaction atomicity, consistency, isolation, and durability.

CO5: Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Reference Books:

1. "Principles of Database and Knowledge–Base Systems", Vol1 by J. D. Ullman, Computer Science Press.
2. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education.
3. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

Course Code: BTCS502-18	Course Title: Formal Language & Automata Theory	3L:1T:0P	3Credits	42 Hours
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Detailed Contents

Module 1: Introduction

Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages. **[3hrs] (CO1)**

Module 2: Regular languages and finite automata:

Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata. **[8hrs] (CO2)**

Module 3: Context-free languages and pushdown automata

Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs. **[8hrs] (CO3)**

Module 4: Context-sensitive languages

Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG. **[5hrs] (CO4)**

Module 5: Turing machines

The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators. **[8hrs] (CO 5)**

Module 6: Undecidability & Intractability:

Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages.

Intractability: Notion of tractability/feasibility. The classes NP and co-NP, their importance. Polynomial time many-one reduction. Completeness under this reduction. Cook-Levin theorem: NP-completeness of propositional satisfiability, other variants of satisfiability. NP-complete problems from other domains: graphs (clique, vertex cover, independent sets, Hamiltonian cycle), number problem (partition), set cover **[12hrs] (CO5)**

Text Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.

Reference Books:

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
4. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

Course Code: BTCS503-18	Course Title: Software Engineering	3L:1T:0P	3Credits	42 Hours
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Detailed Contents:

Module 1:

Evolution and impact of Software engineering, software life cycle models: Waterfall, prototyping, Evolutionary, and Spiral models. Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

[10hrs] (CO 1)

Module 2:

Basic issues in software design, modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, user interface design. Coding standards and Code review techniques.

[8hrs] (CO2)

Module 3:

Fundamentals of testing, White-box, and black-box testing, Test coverage analysis and test case design techniques, mutation testing, Static and dynamic analysis, Software reliability metrics, reliability growth modeling.

[10hrs] (CO 3)

Module 4:

Software project management, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management

[8hrs] (CO4)

Module 5:

ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development.

[6hrs] (CO5)

Text Books:

1. Roger Pressman, "Software Engineering: A Practitioners Approach,(6th Edition), McGraw Hill, 1997.

Reference Books:

1. Sommerville, "Software Engineering, 7th edition", Addison Wesley, 1996.
2. Watts Humphrey, "Managing software process", Pearson education, 2003.
3. James F. Peters and Witold Pedrycz, " Software Engineering – An Engineering Approach", Wiley.
4. Mouratidis and Giorgini. "Integrating Security and Software Engineering–Advances and Future", IGP. ISBN – 1-59904-148-0.
5. Pankaj Jalote, "An integrated approach to Software Engineering", Springer/Narosa.
6. Fundamentals of Software Engineering by Rajib Mall, – PHI-3rd Edition, 2009.

Course Code: BTCS 504-18	Course Title: Computer Networks	3L:1T:0P	3Credits	42 Hrs
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Detailed Contents:

Module 1: Data Communication Components

Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

[8hrs] (CO1)

Module 2: Data Link Layer and Medium Access Sub Layer

Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CDCDMA/CA.

[10 hrs]

(CO2)

Module 3: Network Layer

Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP – Delivery, Forwarding and Unicast Routing protocols. [8 hrs]

(CO3)

Module 4: Transport Layer

Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm. [8 hrs]

(CO3)

Module 5: Application Layer

Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

[8 hrs] (CO4)

Text Books:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson PrenticeHall India.

Reference Books:

1. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
3. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

Course Code: BTCS505-18	CourseTitle: Database management System lab	0L:0T:4P	2Credits
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List of Experiments:

- Task 1:** Introduction to SQL and installation of SQL Server / Oracle.
- Task 2:** Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
- Task 3:** Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.
- Task 4:** Set Operators, Nested Queries, Joins, Sequences.
- Task 5:** Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
- Task 6:** PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
- Task 7:** Stored Procedures and Exception Handling.
- Task 8:** Triggers and Cursor Management in PL/SQL.

Suggested Tools – MySQL, DB2, Oracle, SQL Server 2012, Postgre SQL, SQL lite

Course Code: BTCS506-18	Course Title: Software Engineering Lab	0L:0T:2P	1 Credits
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List of Experiments:

- Task 1:** Study and usage of OpenProj or similar software to draft a project plan
- Task 2:** Study and usage of OpenProj or similar software to track the progress of a project
- Task 3:** Preparation of Software Requirement Specification Document, Design Documents and Testing Phase
- Task 4:** related documents for some problems
- Task 5:** Preparation of Software Configuration Management and Risk Management related documents
- Task 6:** Study and usage of any Design phase CASE tool
- Task 7:** To perform unit testing and integration testing
- Task 8:** To perform various white box and black box testing techniques
- Task 9:** Testing of a web site

Suggested Tools - Visual Paradigm, Rational Software Architect, Visio, Argo UML, Rational Application Developer etc. platforms.

Course Code: BTCS507-18	Course Title: Computer Networks Lab	0L:0T:2P	1 Credits
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List of Experiments:

- Task 1:** To study the different types of Network cables and network topologies.
- Task 2:** Practically implement and test the cross-wired cable and straight through cable using clamping tool and network lab cable tester.
- Task 3:** Study and familiarization with various network devices.
- Task 4:** Familiarization with Packet Tracer Simulation tool/any other related tool.
- Task 5:** Study and Implementation of IP Addressing Schemes
- Task 6:** Creation of Simple Networking topologies using hubs and switches
- Task 7:** Simulation of web traffic in Packet Tracer
- Task 8:** Study and implementation of various router configuration commands
- Task 9:** Creation of Networks using routers.
- Task 10:** Configuring networks using the concept of subnetting
- Task 11:** Practical implementation of basic network command and Network configuration commands like ping, ipconfig, netstat, tracert etc. for troubleshooting network related problems.
- Task 12:** Configuration of networks using static and default routes.

Course Outcomes:

The students will be able to:

- CO1:** Know about the various networking devices, tools and also understand the implementation of network topologies;
- CO2:** Create various networking cables and know how to test these cables;
- CO3:** Create and configure networks in packet trace tool using various network devices and topologies;
- CO4:** Understand IP addressing and configure networks using the subnet in;
- CO5:** Configure routers using various router configuration commands.

Suggested Tools - NS2/3, Cisco packet tracer, Netsim etc..

ELECTIVES- I

Course Code: BTCS 520-18	Course Title: Web Technologies	3L:0T:0P	3 Credits	42 Hours
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Detailed Contents:

Module 1:

Introduction: History and evolution of Internet protocols, Internet addressing, Internet Service Provider (ISP), Introduction to WWW, DNS, URL, HTTP, HTTPS, SSL, Web browsers, Cookies, Web servers, Proxy servers, Web applications. Website design principles, planning the site and navigation. [6 hrs][CO1]

Module 2:

HTML and DHTML: Introduction to HTML and DHTML, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images, Multimedia, Links, Audio, Video, Table and Forms, Document Layout, HTML vs. DHTML, Meta tags, Browser architecture and Website structure. Overview and features of HTML5.

[7 hrs][CO2]

Module 3:

Style Sheets: Need for CSS, Introduction to CSS, Basic syntax and structure, Types of CSS – Inline, Internal and External CSS style sheets. CSS Properties - Background images, Colors and properties, Text Formatting, Margin, Padding, Positioning etc., Overview and features of CSS3.

[7 hrs][CO3]

Module 4:

Java Script: Introduction, JavaScript's history and versions, Basic syntax, Variables, Data types, Statements, Operators, Functions, Arrays, Objects, dialog boxes, JavaScript DOM.

[7 hrs][CO4]

Module 5:

PHP and MySQL: Introduction and basic syntax of PHP, Data types, Variables, Decision and looping with examples, String, Functions, Array, Form processing, Cookies and Sessions, E- mail, PHP-MySQL: Connection to server.

[7 hrs][CO5]

Module 6:

Ajax and JSON: AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax, Advantages & disadvantages, HTTP request, XMLHttpRequest Server Response.

JSON– Syntax, Schema, Data types, Objects, Reading and writing JSON on client and server. Using JSON in AJAX applications. [8 hrs][CO6]

Text Books:

1. Jeffrey C. Jackson, “Web Technologies: A Computer Science Perspective”, Pearson Education
2. Rajkamal, “Internet and Web Technology”, Tata McGraw Hill
3. Ray Rischpater, “JavaScript JSON Cookbook”, Packt Publishing.
4. Ivan Bayross, “Web Enabled Commercial Application Development using HTML, DHTML JavaScript, Perl, CGI”, BPB Publications.
5. Peter Moulding, “PHP Black Book”, Coriolis.

Course Code: BTCS 522-18	Course Title: Web Technologies Lab	0L:0T:2P	1 credits	2 Hours/ week
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List of Experiments:

1. Configuration and administration Apache Web Server.
2. Develop an HTML page to demonstrate the use of basic HTML tags, Link to different HTML page and also link within a page, insertion of images and creation of tables.
3. Develop a registration form by using various form elements like input box, text area, radio buttons, check boxes etc.
4. Design an HTML page by using the concept of internal, inline, external style sheets.
5. Create an HTML file to implement the styles related to text, fonts, links using cascading stylesheets
6. Create an HTML file to implement the concept of document object model using JavaScript
7. Create an HTML page including JavaScript that takes a given set of integer numbers and shows them after sorting in descending order.
8. Write an HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.
9. Create a PHP file to print any text using variable.
10. Demonstrate the use of Loops and arrays in PHP
11. Create a PHP file using GET and POST methods.
12. A simple calculator web application that takes two numbers and an operator (+, -, /, * and %) from an HTML page and returns the result page with the operation performed on the operands.
13. Implement login page contains the user name and the password of the user to authenticate with Session using PHP and MySQL, also implement this with the help of PHP-Ajax.
14. A web application for implementation:
 - a. The user is first served a login page which takes user’s name and password. After submitting the details the server checks these values against the data

from a database and takes the following decisions.

- b. If name and password matches, serves a welcome page with user's full name.
- c. If name matches and password doesn't match, then serves "password mismatch" page
- d. If name is not found in the database, serves a registration page, where user's full name is asked and on submitting the full name, it stores, the login name, password and full name in the database (hint: use session for storing the submitted login name and password)

15. Demonstrate the use of Ajax and JSON Technologies in programming examples.

16. Demonstrate the use of web site designing tools such as Joomla, WordPress.

17. Implement at least one minor project using different technologies mentioned in theory of the subject.