

R.T.M. Nagpur University, Nagpur
Four Year B.Tech Course
(Revised curriculum as per AICTE Model Curriculum)
B.Tech. VI Semester (Computer Technology) Scheme

Subject Code	Subject	Teaching Scheme			Evaluation Scheme			Credits	Category
		L	T	P	CA	UE	Total		
1 BTCT601T	Compiler Design(TH)	3	0	0	30	70	100	3	PCC
2 BTCT601P	Compiler Design (PR)	0	0	2	25	25	50	1	PCC
3 BTCT602T	Data Warehousing and Mining(TH)	3	0	0	30	70	100	3	PCC
4 BTCT602P	Data Warehousing and Mining(PR)	0	0	2	25	25	50	1	PCC
5 BTCT603T	Elective II	3	0	0	30	70	100	3	PEC
6 BTCT604T	Elective III	3	0	0	30	70	100	3	PEC
7 BTCT605T	Open Elective – I	3	0	0	30	70	100	3	OEC
8 BTCT606T	Economics of IT industry	2	0	0	15	35	50	2	HSMC
9 BTCT607P	Mini Project	0	0	4	25	25	50	2	Project
10 BTCT608T	Organizational Behaviour (Audit Course)	2	0	0	0	0	0	0	Audit
Total		19	00	08	240	460	700	21	

Elective -II BTCT603T	Elective -III BTCT604T	Open Elective -I BTCT605T
BTCT603T-1 High Performance Computer Architecture	BTCT604T-1 Embedded System	BTCT605T-1 Digital Image Processing
BTCT603T-2 Software Testing and Quality Assurance	BTCT604T-2 Mobile Application and Development	BTCT605T-2 Advanced Web Technologies
BTCT603T-3 Advance Microprocessor	BTCT604T-3 Cloud Computing	BTCT605T-3 Multimedia and

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Dr. Ernst Ernst Ernst

Multimedia and

and Interfacing

Animation

PCC-CS Professional Core Courses **ESC** – Engineering Science Courses **LC** – Laboratory Course
OEC-CS Open Elective Courses **MC** – Mandatory Course **PROJ-CS** Project (Min. one month
internship is derivable) **BSC** – Basic Science Courses **PEC-CS** Professional Elective Courses
HSMC- Humanities and Social Sciences including Management Courses

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**Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Compiler Design (Theory)**

Total Credits: 03	Subject Code: BTCT601T
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment: 70 Marks

Course Objectives:

1. To make students to understand basics of Compilation Process.
2. To make students to understand thoroughly the concepts of various phases of Lexical Analysis, Syntax Analysis, Syntax Directed Translation Scheme.
3. To make students to understand Code generation and code Optimization techniques

Course Outcomes:

After completing the course, students will be able to

1. Explain basic fundamentals of the translators and role of the lexical analysis.
2. Describe principles of Parsing and will be able design various Top-Down and Bottom-Up Parsers
3. Explain various forms of intermediate code and will be able to demonstrate use of SDTS to translate elementary programming constructs.
4. Describe various optimization techniques and will be able to develop simple code generators.
5. Explain storage allocation methods, error recovery techniques and will be able to apply various error recovery techniques in parsers.

Unit I

(06 Hrs)

Translators, Compilers, Interpreters, Just in Time Compilers, Cross Compilers, Bootstrapping, Structure of a typical compiler, overview of lexical analysis, syntax analysis, code optimization and code generation, design of lexical analyzer.

Unit II

(08 Hrs)

Parsers, Shift-Reduce Parser, Top-down parser, Predictive Parsers, Bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR, LR parsers.

Unit III

(08 Hrs)

Syntax directed schemes, intermediate code, Parse trees, Syntax trees, three address code, Quadruples, Triples, Indirect Triple, using syntax directed translation schemes to translate assignment statements, Boolean expressions, if then else structures

Unit IV

(08 Hrs)

Sources of Optimization, Loop Optimization, DAG representation of basic blocks, Global data flow analysis, Dominators, Loop invariant computations, Induction variable elimination, Loop unrolling, Loop jamming, simple code generator, Register allocation and assignment

Unit V**(06 Hrs)**

Storage allocation and run time storage administration, symbol table management, types of Errors, Lexical phase Errors, Syntactic phase Errors, error recovery in LR parsing, error recovery in LL parsing,

Text Books:

1. Alfred V.Aho, Jeffrey Ullman :Principals of Compiler Design, ,Narosa Publications.
2. O.G. Kakde : Compiler Design , Laxmi Publication , 4th Edition.

Reference Books:

1. Fischer and LeBlanc: Crafting a compiler:, Addison Wesley

Compiler Design (Practical)

Total Credits: 01	Subject Code: BTCT601P
Teaching Scheme: Lectures: 00 Hours/Week Tutorials: 00 Hours/Week Practical: 02 Hours/Week	Examination Scheme: College Assessment: 25 Marks University Assessment:25 Marks

Minimum ten experiments should be conducted based on the theory syllabus.

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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Data Warehousing and Mining (Theory)

Total Credits: 03	Subject Code: BTCT602T
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment: 70 Marks

Course Objectives:

To make students

1. To understand the basic concepts of Data Warehouse and Data Mining techniques.
2. Capable to create a data warehouse and to process raw data .
3. Able to apply basic classification, clustering on a set of data.
4. Able to identify frequent data items and to apply association rule on a set of data.
5. To learn recent trends of data mining such as web mining.

Course Outcomes:

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

1. Understand the data warehousing components and design a data warehouse for any organization.
2. Learn data mining concepts and working.
3. Explore functionality of the various data mining techniques.
4. Discuss the data-mining tasks like classification, clustering, association mining and extract knowledge using data mining techniques.
5. Apply data mining techniques in trending domain such as web mining and Solve real-world problems in business and scientific information using data mining.

UNIT I

(09 Hrs)

Introduction: Characteristics, Operational database systems and data warehouse (OLTP & OLAP), Multidimensional data models, Data warehouse architecture, OLAP Operations, Design and construction of data warehouses.

UNIT II

(06 Hrs)

Fundamentals of data mining: Data mining functionalities, Classification of data mining systems, Data mining task primitives, Major issues and challenges in data mining, Data preprocessing- need for processing, data cleaning, integration, transformation, data reduction, data mining application areas.

UNIT III

(09 Hrs)

Classification: Introduction, Decision tree, Building decision tree- tree induction algorithm, Split algorithm based on information theory, Split algorithm based on gini index, Decision tree rules, Naive based methods.

Clustering: Cluster analysis, Desired features, Types of data in cluster analysis, Computing distance. Categorizations of major clustering methods – Partitioning methods (K-means, EM), Hierarchical methods (agglomerative, divisive).

UNIT IV**(06 Hrs)**

Mining frequent patterns and Association Rules: Market basket analysis, Frequent item sets and association rules, Apriori algorithm, FP growth algorithm, Improving efficiency of Apriori and FP growth algorithms.

UNIT V**(06 Hrs)**

Web Data Mining: Introduction, Graph properties of web, Web content mining, Web structure mining, Web usage mining, Text mining, Visual web data mining, Temporal and Spatial data mining.

TEXT BOOK:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.
2. A. K. Pujari, "Data Mining Techniques", Second Edition, University press, 2013.
3. Jason Bell, "Machine Learning for Big Data: Hands-on for Developers and Technical Professionals, Wiley India Publications, 2013.

Data Warehousing and Mining (Practical)

Total Credits: 01	Subject Code: BTCT602P
Teaching Scheme: Lectures: 00 Hours/Week Tutorials: 00 Hours/Week Practical: 02 Hours/Week	Examination Scheme: College Assessment: 25 Marks University Assessment: 25 Marks

Minimum ten experiments should be conducted based on the theory syllabus.

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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Elective II: High Performance Computer Architecture (Theory)

Total Credits: 03	Subject Code: BTCT603T-1
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment: 70 Marks

Course Objectives:

1. To make students familiar with fundamental of computer organization and performance laws
2. To discuss the concept and issues in instruction level Parallelism
3. To discuss multiprocessor architecture and synchronization issue in multiprocessor

Course Outcomes: After completing the course, students will be able to

1. Compare Multi vector and SIMD Computers, PRAM and VLSI Models
2. Explain Basic concepts, instruction and arithmetic pipelines, and hazards in a pipeline:
3. Illustrate Concepts and Challenges, Basic Compiler Techniques for Exposing ILP
4. Explain Virtual memory organization, mapping and management
5. Compare Parallel and Scalable Architecture, Multiprocessors and Multicomputer:

Unit I

(08 Hrs)

Theory of Parallelism: Parallel Computer Models, The State of Computing, Multiprocessors and Multicomputers, Multi vector and SIMD Computers, PRAM and VLSI Models, Architectural Development Tracks, Principles of Scalable Performance: Performance Metrics and Measures, Speedup and Performance Laws.

Unit II

(08 Hrs)

Pipelining, Basic concepts, instruction and arithmetic pipelines, and hazards in a pipeline: structural, data and control hazards, overview of hazard resolution technique, Dynamic instruction scheduling, branch prediction techniques, Exception handling, Pipeline optimization techniques, Compiler techniques for improving performance.

Unit III

(08 Hrs)

Instruction Level Parallelism: Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch Costs with Prediction , Overcoming Data Hazards with Dynamic Scheduling ,Dynamic Scheduling: Algorithm, Data level and Thread Level Parallelism.

Unit IV

(06 Hrs)

Memory Hierarchies: Basic concept of hierarchical memory organization, Hierarchical memory technology, main memory, Inclusion, Coherence and locality properties, Cache memory design and implementation, Techniques for reducing cache misses, Virtual memory organization, mapping and management techniques, memory replacement policies, RAID.

Unit V

(06 Hrs)

Parallel and Scalable Architecture: Multiprocessors and Multicomputer: Multiprocessor System Interconnect, Cache Coherence and Synchronization Mechanism, Multi vector and SIMD Computers: Vector Processing Principles, Multi vector-Multiprocessor, Compound Vector Processing.

Text Books:

1. John. Hennessy & David A . Patterson, "Computer Architecture A quantitative approach", 5 th Edition, Morgan Kaufmann Publications.
2. Kai Hwang and A. Briggs , "Computer Architecture and parallel Processing " , International Edition McGraw-Hill.

Reference Book

1. Kai Hwang and Naresh Jotwani, "Advanced Computer Architecture: Parallelism, Scalability and Programmability" 2 nd Edition, TMH Publications
2. David A. Kular and Jasvinder Pal Singh, " Parallel Computer Architecture", Morgan Kaufmann Publications.



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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Elective II: Software Testing and Quality Assurance(Theory)

Total Credits: 03	Subject Code: BTCT603T-2
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:

1. To learn the criteria for test cases.
2. To learn the design of test cases.
3. To understand test management and test automation techniques.
4. To apply test metrics and measurements.

Course Outcomes: After completing the course, students will be able to

- 1.Design test cases suitable for a software development for different domains.
2. Identify suitable tests to be carried out.
3. Prepare test planning based on the document, develop and validate a test plan
4. Document test plans and test cases designed.
5. Use automatic testing tools.

Unit I

(08 Hrs)

Overview of software evolution, SDLC, Testing Process, Terminologies in Testing: Error, Fault, Failure, Verification, Validation, Difference between Verification and Validation, Test Cases, Testing Suite, Test Oracles, Impracticality of Testing All data; Impracticality of testing AllPaths
Introduction: Purpose – Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.
Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design.

Unit II

(07 Hrs)

Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing -Compatibility testing – user documentation testing – domain testing – Random Testing -Requirements based testing
Using White Box Approach to Test design – Test Adequacy Criteria
– static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs
– Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches- Evaluating Test Adequacy Criteria.

Unit III

(07 Hrs)

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing -Compatibility testing – Testing the documentation -Website testing.

Unit IV

(07 Hrs)

Software Testing Activities: Levels of Testing, Debugging, Testing techniques and their Applicability, Exploratory Testing Automated Test Data Generation: Test Data, Approaches to test data generation, test data generation using genetic algorithm, Test Data Generation Tools, Software Testing Tools, and Software test Plan.

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

Unit V

(07 Hrs)

Object oriented Testing: Definition, Issues, Class Testing, Object Oriented Integration and System Testing. Testing Web Applications: What is Web testing?, User interface Testing, Usability Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing.

Linguistic – Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases .

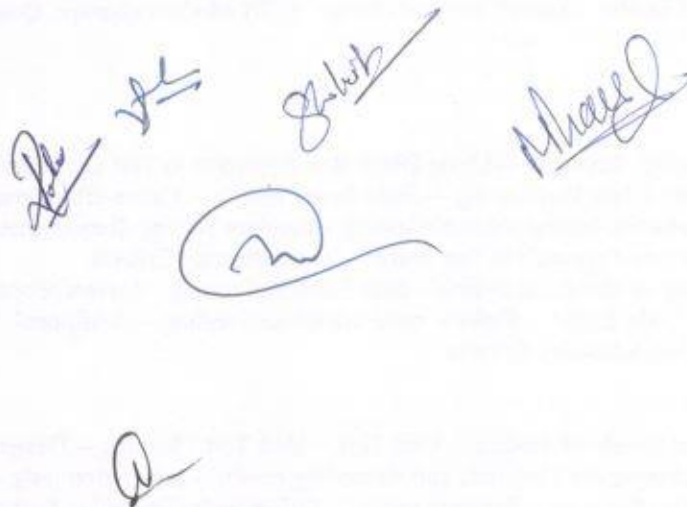
Logic Based Testing – Decision Tables – Transition Testing – States, State Graph, State Testing.

Text Books:

1. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing – Principles and Practices, Pearson Education, 2006.
2. Ron Patton, Software Testing, Second Edition, Sams Publishing, Pearson Education, 2007.
3. Ilene Burnstein, Practical Software Testing, Springer International Edition, 2003.

Reference Books:

1. Edward Kit, Software Testing in the Real World – Improving the Process, Pearson Education, 1995.
2. Boris Beizer, Software Testing Techniques – 2nd Edition, Van Nostrand Reinhold, New York, 1990.
3. Aditya P. Mathur, Foundations of Software Testing _ Fundamental Algorithms and Techniques, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Elective II: Advance Microprocessor & Interfacing(Theory)

Total Credits: 03	Subject Code: BTCT603T-3
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:

1. To study architecture of microprocessor & to understand the concept of memory organization.
2. To master the assembly language programming using concepts like assembler directives, procedures, macros, software interrupts etc.
3. To create an exposure to basic peripherals, its programming and interfacing techniques
4. To understand the concept of Interrupts and interfacing details of 8086.
5. To impart the basic concepts of serial communication in 8086.

Course Outcomes: After completing the course, students will be able to

1. Describe internal organization of 8086/8088 microprocessors. Demonstrate the concept of interrupts and its use
2. Understand assembly language programming using concepts like assembler directives, procedures, macros, software interrupts. Describe the concept of addressing modes
3. Demonstrate Interfacing of 8086 with Keyboard/ Display, ADC/DAC,8255 PPI,Programmable Keyboard/Display controller 8279.
4. Demonstrate Interfacing of 8086 with Programmable interval timer/counter 8254, 8259 PIC.Demonstrate the concept of Serial data communication using USART 8251
5. Describe 8087 Numeric coprocessor & its use in practical application.Describe the concept of DMA & Pentium.

Unit I

(08 Hrs)

8086 /8088 architecture: 8086 /8088 architecture- functional diagram, pin diagram,features and operating modes, minimum mode and maximum mode, memory segmentation, programming model, Memory addresses, physical memory organization & interfacing, Interrupts of 8086.

Unit II

(06 Hrs)

Clock generator 8284,Instruction set and assembly language programming of 8086: Instruction formats. Addressing modes, instruction set, assembler directives. Simple programs involving logical, branch and call instructions.Sorting, evaluating arithmetic expressions, string manipulations instructions.

Unit III

(08 Hrs)

8086 & Peripheral Interfacing I: Assembly language programming of 8086,Interrupt structure, I/O interfacing, Interfacing of peripherals like 8255 PPI, multiplexed 7-seg display & matrix keyboard interface using 8255. Programmable Keyboard/Display controller 8279, Organization, Working modes, command words & interfacing.

Unit IV

(08 Hrs)

8086 & Peripheral Interfacing II : Programmable interval timer/counter 8254; Architecture, working modes, interfacing 8259 PIC, Organization, control words, interfacing, cascading of 8259's. Serial communication, Classification & transmission formats. USART 8251, Pins & block diagram, interfacing with 8086 & programming.

Unit V

(06 Hrs)

Numeric Co-processor & DMA Controller: 8086 maximum mode pin diagram, Closely coupled & loosely coupled multiprocessor system, 8087 Numeric coprocessor, architecture, interfacing with 8086, instruction set. DMAC 8237, Architecture, interfacing & programming, Introduction to Pentium.

Text Books:

1. D.V.Hall, Microprocessors and Interfacing. TMGH
2. Advanced microprocessors and peripherals-A.K ray and K.M.Bhurchandani, TMH

Reference Books:

1. Intel Reference Manuals, Microprocessors : Intel
2. 8086 MICROPROCESSOR AND APPLICATIONS 3ED (PB 2022) by A.Nagoorkani

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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Elective III: Embedded System(Theory)

Total Credits: 03	Subject Code: BTCT604T-1
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:

1. To make students to conceptualize the basics of embedded systems
2. To make students to conceptualize the basics of organizational and architectural issues of a microcontroller.
3. To make students to learn programming techniques used in microcontroller.
4. To make students to understand fundamentals of real time operating system
5. To make to design embedded system

Course Outcomes: After completing the course, students will be able to

1. Define and explain the basic fundamental, problems and challenges and application areas in embedded system.
2. Illustrate the fundamental of 8051 Microcontroller ,
4. Illustrate the communication with 8051 Microcontroller and analyze through programming.
4. Illustrate the basic concepts with working environment of Real Time Operating System
5. Design embedded system and apply in case study .

Unit I

(06 Hrs)

Introduction to Embedded Systems: Overview of Embedded System Architecture, Application areas, Categories of embedded systems, specialties of embedded systems. Recent trends in embedded systems. Brief introduction to embedded microcontroller cores CISC, RISC, ARM, DSP and SoC.

Unit II

(06 Hrs)

The Microcontroller Architecture: Introduction to 8051 Microcontroller, Architecture, Pin configuration, Memory organization, Input /Output Ports, Counter and Timers, Serial communication, Interrupts.

Unit III

(10 Hrs)

Assembly Language Programming of 8051: Instruction set, Addressing modes, Development tools, Assembler Directives, Programming based on Arithmetic & Logical operations, I/O parallel and serial ports, Timers & Counters, and ISR.

Unit IV

(10 Hrs)

Embedded / Real Time Operating System: Architecture of kernel, Task and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message queues, Event registers, Pipes, Signals, Timers, Memory management, Priority inversion problem. Off-the-Shelf Operating Systems, Embedded Operating Systems, Real Time Operating System (RTOS) and Handheld Operating Systems.



Unit V

(04 Hrs)

Embedded System - Design case studies: Digital clock, Battery operated smart card reader, Automated meter reading system, Digital camera.

Text Books:

1. The 8051 microcontroller & Embedded systems, M. A. Mazidi, J. G. Mazidi, R. D. McKinlay, Pearson
2. The 8051 microcontroller & Embedded systems, Kenneth J. Ayala, Dhananjay V. Gadre, Cengage Learning
3. Embedded / real – time systems: concepts, design & programming, Black Book, Dr. K. V. K. K. Prasad, Dreamtech press
4. Introduction to embedded systems, Shibu K. V., McGraw Hill

Reference Books:

1. Embedded systems an integrated approach, Laya B. Das, Pearson.
2. Embedded system design A Unified hardware/software Introduction, Frank Vahid, Tony Givargis, Wiley
3. Raj Kamal, Embedded Systems Architecture, Programming and design, Tata MCgraw-Hill Publication.

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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Elective III: Mobile Application and Development(Theory)

Total Credits: 03	Subject Code: BTCT604T-2
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:

To make students

1. To understand android SDK.
2. To aware basic understanding of Android application development.
3. To inculcate working knowledge of Android Studio development tool.

Course Outcomes:

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

1. Identify various concepts of mobile programming that make it unique from programming for other platforms.
2. Critique mobile applications on their design pros and cons.
3. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
4. Program mobile applications for the Android operating system that use basic and advanced phone features.
5. Deploy applications to the Android marketplace for distribution.

UNIT - I

(08 Hrs)

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

UNIT - II

(08 Hrs)

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT - III

(08 Hrs)

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

UNIT - IV

(06 Hrs)

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

UNIT - V

(06 Hrs)

Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education.
2. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd.
3. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd.
4. Android Application Development All in one for Dummies by Barry Burd.

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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Elective III: Cloud Computing(Theory)

Total Credits: 03	Subject Code: BTCT604T-3
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:

1. To make students familiar with the concepts, characteristics, delivery models and benefits of cloud computing.
2. To make the student aware of the key security and compliance challenges of cloud computing
3. To make students understand about key technical and organizational challenges and the different characteristics of public, private and hybrid cloud deployment models.

Course Outcomes :After completing the course, students will be able to

1. The concepts, characteristics, delivery models and benefits of cloud computing.
2. Illustrate and explain in detail the cloud computing architecture and classify various types of clouds.
3. Explain big data analysis, Hadoop and MapReduce and introduction to tools.
4. Illustrate various security concepts in cloud computing and need of security measures.
5. Discuss and implement Cloud based Application using C# and windows azure

Unit I

(08 Hrs)

Introduction to Cloud Computing, Introduction to Cloud Computing: Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages of Cloud Computing, Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing. Legal issues when using cloud models, challenges in cloud computing.

Unit II

(08 Hrs)

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

Unit III

(06 Hrs)

Big Data Analysis, Hadoop and Map Reduce: Introduction, Clustering Big Data, Classification of Big Data, Hadoop MapReduce Job Execution, Hadoop scheduling, Hadoop cluster setup, configuration of Hadoop, starting and stopping Hadoop cluster.

Unit IV

(06 Hrs)

Security in Cloud: Cloud Security Challenges, Infrastructure Security, Network level security, Host level security, Application level security, data privacy, data security, application security, virtual machine security, Identity Access Management, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.

Unit V

(08 Hrs)

Application Development using C#: Understand object oriented concepts in C#.NET, Creation of UI and event handling, web page creation using ASP.NET, ADO.NET architecture, implementation of data set, using ADO.NET in console application, using ADO.NET in web application.

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Creating Cloud Application using Azure: Creating simple cloud application, Azure fabrics, Azure service, and storage types and deployment of application to the production environment.

Text Books:

1. McOhen K. Hurley, "Google Compute Engine", O'Reilly Edition, 2014 .
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wile, 2011.
3. Arshdeep Bahga, Vijay Madisetti, "Cloud Computing, A Hands-on Approach", Universities Press, 2013.
4. R. J. Dudley, N. A. Duchene, "Microsoft Azure: Enterprise Application Development", Packt Publication, 2010.

Reference Books:

1. B. M. Harwani, "Cloud Computing using Windows Azure ", Arizona Business Alliance Publication, 2014.
2. J. W. Rittinghouse, J. F. Ransome, "Cloud Computing, Implementation, Management and Security", CRC Press, 2009.

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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Open Elective I: Digital Image Processing(Theory)

Total Credits: 03	Subject Code: BTCT605T-1
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:

1. To understand the basic fundamentals of image.
2. To understand and describe various techniques for image enhancement and restoration.
3. To understand and describe various techniques for image segmentation and compression.

Course Outcomes:After completing the course, students will be able to

1. Explain the basic fundamentals of Image and compare different 2 D transforms.
2. Design and implement various image enhancement techniques.
3. Design and implement various image restoration techniques.
4. Design and implement various image segmentation techniques.
5. Design and implement various image compression techniques.

UNIT I:

(06 Hrs)

Digital image fundamentals: Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms -DFT, DCT, KLT, SVD.

UNIT II:

(09 Hrs)

Image enhancement: Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contra harmonic mean filters, Homomorphic filtering, Color image fundamentals -RGB, HSI models, Color image enhancement.

UNIT III:

(07 Hrs)

Image restoration: Image Restoration -degradation model, unconstrained restoration -Lagrange multiplier and constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations.

UNIT IV:

(06 Hrs)

Image segmentation: Edge detection, Edge linking via Hough transform, Thresholding, Region based segmentation, Region growing, Region splitting and merging, Segmentation by morphological watersheds, basic concepts, Dam construction, and Watershed segmentation algorithm.

UNIT V:

(08 Hrs)

Image compression: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

Text Books:

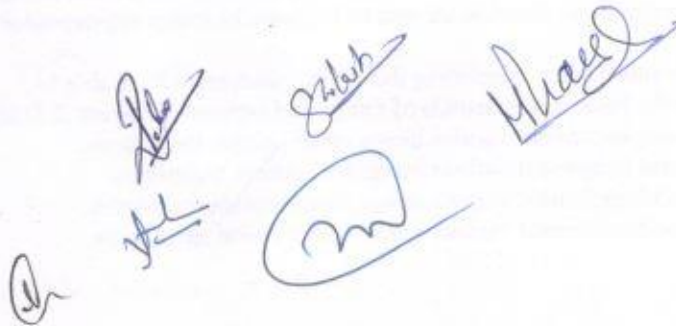
1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson Education, Third Edition, 2008.

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2. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson 2002.

Reference Books:

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
3. D. E. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, Digital Image Processing', John Wiley, New York, 2002
5. Milan Sonka et al, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999,

The block contains five distinct handwritten signatures in blue ink. From left to right: a small, stylized signature; a signature that appears to be 'Jain'; a signature that appears to be 'Gonzalez'; a signature that appears to be 'Pratt'; and a signature that appears to be 'Sonka'. The signatures are arranged in a slightly curved line across the middle of the page.

Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Open Elective I: Advanced Web Technologies(Theory)

Total Credits: 03	Subject Code: BTCT605T-2
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with Javascript and AJAX.

Course Outcomes:After completing the course, students will be able to

1. Gain knowledge of client-side scripting, validation of forms and AJAX programming
2. Understand server-side scripting with PHP language
3. Understand what is XML and how to parse and use XML Data with Java
4. Introduce Server-side programming with Java Servlets and JSP
5. Introduce Scripting Language PHP

Unit I

(07 Hrs)

HTML Common tags- List, Tables, images, forms, Frames; **Cascading Style sheets**; **XML**: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

Unit II

(07 Hrs)

Client-side Scripting: Introduction to Javascript, Javascript language – declaring variables, scope of variables, functions. event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.

Unit III

(07 Hrs)

Introduction to Servlets: Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

Unit IV

(07 Hrs)

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP

Unit V

(08 Hrs)

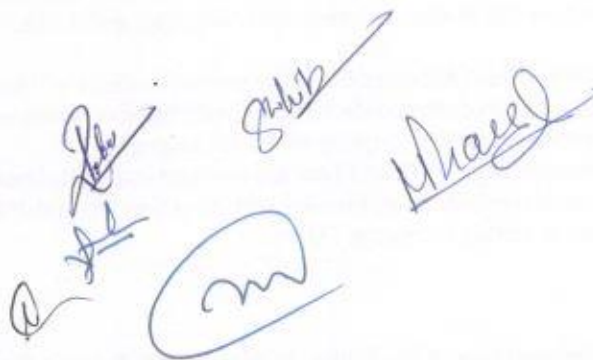
Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

Text Books:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

Reference Books:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech
2. Java Server Pages —Hans Bergsten, SPD O'Reilly,
3. Java Script, D.Flanagan
4. Beginning Web Programming-Jon Duckett WROX. R18 B.TECH CSE III YEAR
5. Programming world wide web, R.W.Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web — How to program. Dietel and Nieto, Pearson.

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Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Open Elective I: Multimedia and Animation(Theory)

Total Credits: 03	Subject Code: BTCT605T-3
Teaching Scheme : Lectures: 03 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 03 Hrs. College Assessment : 30 Marks University Assessment:70 Marks

Course Objectives:

1. To introduce the principles and current technologies of multimedia systems.
2. Issues in effectively representing, processing, and retrieving multimedia data such as sound and music, graphics, image and video will be addressed.
3. The students will gain hands-on experience in those areas by implementing some components of a multimedia streaming system as their term project.
4. Latest Web technologies and some advanced topics in current multimedia research will also be discussed.

Course Outcomes: After completing the course, students will be able to

1. To acquire fundamentals principles of multimedia, including digitization and data compression for non-textual information
2. To understand issues in representing, processing, and transmitting multimedia data
3. To understand core multimedia technologies and standards
4. To gain hands-on experience in image, sound and video editing and in some aspects of multimedia authoring (incorporating images, sound, video, and animation)
5. To design, capture, store and integrate sound, images and video to deliver multimodal information.

Unit I

(08 Hrs)

Limitations of Traditional Input Device, Multimedia Elements. Multimedia Application. Multimedia System Architecture, Evolving Tech. for Multimedia, Defining Objects for Multimedia Systems, Multimedia Data Interface Standard. Magnetic Media Technology, Hard disk Technology, RAID, Criteria for Selection of RAID, Use of Magnetic Storage in Multimedia, Optical Media, Magneto Optical.

Unit II

(07 Hrs)

Evaluating the Compression System, How much, Compression, How Good is Picture, How fast Does it Compress or Decompress, What H/W & S/W Does it take, Redundancy & Usability. Types of compression, Need of Data Compression, Color Gray Scale and Still Video Image, Color Characteristics, Color Model, Simple Compression Technique, Interpolative, Predictive, Transfer Coding, Discrete Transfer, Statistical (Huffman, arithmetic) JPEG Compression, Requirement Addressing JPEG, Definition of JPEG Standard, Overview of JPEG Components, JPEG methodology, The discrete cosine Transfer, Quantization, Zigzag Sequence.

Unit III

(07 Hrs)

Introduction to Standardization of Algorithm •File Formats •History of RIF, TIFF TIFF Specification, TIFF structure, TIFF tag, TIFF Implementation issues, TIFF classes RIFF Chunks with two sub chunks, List chunk, RIFF waveform Audio File format, RIFF MIDI file Format, RIFF DIB's, •Introduction to RIFF, AVI RIFF AVI File format, Index Chunk and Boundary condition handling for AVI files., AVI Indeo File Format. JPEG-objectives, Architecture, JPEG-DCT encoding Quantization. •JPEG-stastical coding, predictive lossless coding, JPEG performance •MPEG-objectives, Architecture, BIT stream syntax performance •MPEG2 & MPEG4.

Unit IV

(07 Hrs)

Multi Media Authoring System and its type. Hypermedia Application Design consideration. User Interface Design. Information Access. Object Display / Playback Issues. Components of Distributed Multimedia Systems 5.2 Distributed Client Server Operation 5.3 Multimedia Object Server 5.4 Multi Server Network topologies 5.5. Distributed Multimedia Databases.

Unit V

(07 Hrs)

Introduction to Multimedia tool – Flash. Creating & Modifying elements 6.3 Line tool, fill/attributes, different shapes, text tools & pen tool. Selecting lines fill with arrow tool, selecting shapes, using lasso tool performing basic editing tools, selecting & deselecting elements, modifying created objects.

Text Books:

1. Prabhat k. Andheigh, Kiran Thakrar, John F, Multimedia Systems Design, Prentice Hall of India
2. Koegel Buford , Multimedia Systems Design, Pearson Education
3. Katherine Ulrich ,Micromedia Flash for Windows and Macintosh, Pearson Education

Reference Books:

1. Free Halshal, Multimedia Communication , Pearson Education
2. . R. Steimnetz, K. Nahrstedt, Multimedia Computing, Communication and Application , Pearson Education
3. .D. Gibson, Multimedia Communication Directions and Innovations, Academic Press, Hardcourt India
4. J.F. Kurose, K. W. Rose, Computer Networking, Pearson Education

The block contains several handwritten signatures and initials in blue ink. On the left, there is a small, stylized signature. In the center, there are two larger, more complex signatures, one above the other. To the right of these, there is a large, circular, scribbled mark. Further to the right, there is another signature that appears to be 'Whayl'. The handwriting is cursive and somewhat informal.

Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Economics of IT industry(Theory)

Total Credits: 02	Subject Code: BTCT606T
Teaching Scheme : Lectures: 02 Hours/Week Tutorials: 00 Hours/Week Practical: 00 Hours/Week	Examination Scheme : Duration of University Exam : 02 Hrs. College Assessment : 15 Marks University Assessment:35 Marks

Course Outcomes:After completing the course, students will be able to

1. Distinguish between Micro and Macro economics
2. Relate economics concept with IT industry
3. Identify key trends in IT industry
4. Understand the key economic drivers of IT industry.

Unit 1

Difference between Micro and Macroeconomics, law of demand and supply, concept and types of elasticity of demand, deflation and recession.

Unit 2

Role of Information and technology industry in economic growth of the country, labour intensive verses capital intensive industry, the concept of digital economy and digital age, digital divide, various phases of business cycle.

Unit 3

Merger and acquisition, types of merger, advantages of merger, hostile takeover, concept of top line and bottom line growth, Contribution of E-Commerce in economic growth, information technology and environment- the challenge of E - waste.

Unit 4

Venture and angel funding as sources of finance, organic verses inorganic growth model, 5 level capability maturity model of IT industry, Concept of agile organization

List of Reference Books

1. Modern economic theory by K.K.Dewett,
2. Information and economic development by Yutuka Khurana, IGI Global publisher.
3. The economics of information technology by Paul Jowett, Margaret Rothwell. St Martin Press New York.
4. Industrial Economics. By, Ranjana Seth, Ane Book Pvt Ltd.

Faculty of Science and Technology
R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Mini Project(Practical)

Total Credits: 02	Subject Code: BTCT607P
Teaching Scheme : Lectures: 00 Hours/Week Tutorials: 00 Hours/Week Practical: 04 Hours/Week	Examination Scheme : College Assessment : 25 Marks University Assessment:25 Marks



R.T.M Nagpur University, Nagpur
Syllabus for B.Tech. Sixth Semester CT
Organizational Behaviour(TH) Audit Course
Subject Code: BTCT608T

Total Credits: 00
Teaching Scheme :
Lectures: 02 Hours/Week
Tutorials: 00 Hours/Week
Practical: 00 Hours/Week

Objective: The objective of the course is to create awareness among learners about the various essential aspects of organizational processes and structure and motivation in organization.

Course outcomes: By the end of the course, students will be able to

1. understand the concept and importance of organizational behaviour.
2. acquire the knowledge of interpersonal behaviour and transaction analysis
3. know different traits and theories of personality
4. analyze the importance of motivation in organization and types of leadership

Unit 1. Introduction to organizational behaviour.

Concept of organization behaviour, Importance of organization behaviour, Key elements of organization behaviour, scope of organizational behaviour.

Unit 2: Introduction to interpersonal behaviour.

Nature and meaning of interpersonal behaviour, concept of transaction analysis, benefits and uses of transaction analysis, Johari window model.

Unit 3: Introduction to personality

Definition and meaning of personality, importance of personality, theories of personality, personality traits.

Unit 4: Introduction to Motivation and leadership.

Concept and importance of motivation, Maslow's two factor theory of motivation. Significance of motivation in organization. Types of leadership styles.

List of books

1. Organizational behaviour by MN Mishra, published by S.Chand.
2. The human side of organization by Michale Drafke, published by Pearson education.
3. Management and Organizational behaviour by Laurie.J. Mullins, published by Pearson education.
4. Organizational behaviour by K. Aaswathappa, Published by Himalaya publications.