RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

(Revised Curriculum as per AICTE Model Curriculum)

SCHEME OF EXAMINATION FOR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S.)

BRANCH: INFORMATION TECHNOLOGY

S. N.	Subject Code	Subject	Teaching Scheme			Evaluation Scheme			Credits	Category
			L	T	P	CA	UE	Total		
1	BEIT501T	Software Engineering & Project Management	3	-	-	30	70	100	3	PCC
2	BEIT501P	Software Engineering & Project Management Lab	-	-	2	25	25	50	1	PCC
3	BEIT502T	Design and Analysis of Algorithms	2	1	-	30	70	100	3	PCC
4	BEIT503T	Java Programming	3	-	-	30	70	100	3	PCC
5	BEIT503P	Java Programming Lab	-	-	2	25	25	50	1	PCC
6	BEIT504T	Theory of Computation	2	1	-	30	70	100	3	PCC
7	BEIT505T	Elective- I	3	-	-	30	70	100	3	PEC
8	BEIT506P	Software Lab (Basics of AR &VR/Web Technology)	-	-	2	25	25	50	1	LC
9	BEIT507T	Effective Technical Communication	2	-	-	15	35	50	2	HSMC
10	BEIT508T	Yoga & Meditation	2	-	-					Audit
		Total	**17**	**02**	**06**	**240**	**460**	**700**	**20**	

(Dr. M. V. Bramhe)

Prof. S. J. Dudhe

(Dr A N Thakare)

(Prof. V. P. Thakare)

Dr. S. V. Sonekar
Chairman

Elective –I (BEIT505T)

1. Gaming Architecture & Programming (BEIT505T.1)

2. High Performance Computer Architecture (BEIT505T.2)

3. Human Computer Interface(BEIT505T.3)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Software Engineering & Project Management **Subject code: BEIT501T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs(Theory)	3	-	3	30	70	100

Aim: To learn quality software development and project management for a business system.

Prerequisite(s): None

Course Objectives:

1	To understand general idea of software engineering
2	To develop skills to design various software process models
3	To develop skills required for software testing and various risk strategies

Course Outcome:

At the end of this course students are able to:

CO1	Acquire Knowledge of software engineering methods, practices, process models and application.
CO2	Understand measure, metrics and indicators and learn various Modeling Approach
CO3	Analyze and extract requirements for the product and translate these into a documented design using different modeling techniques.
CO4	Learn software testing methods and types, And to understand debugging concept with various testing methods.
CO5	Understand project management, and to know software risks and principles of quality management, further the concept of re-engineering and reverse engineering.

Unit 1	Basics: Introduction to Software Engineering, Software Myths, Software Engineering - A Layered Technology. Software Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, Agile Process Models
Unit 2	Measures Metrics and Indicator, Metrics for process & projects: Software measurement, metrics for software quality. System Engineering: Hierarchy, Business Process Engineering, Product Engineering, System Modeling, Requirements Engineering: Requirements Analysis, Analysis Modeling Approaches, Data Modeling, Object -Oriented Analysis, Scenario -Based Modeling, Flow-Oriented Modeling, Class -based Modeling, Behavioral Model
Unit 3	Design Engineering Concepts, Design Model, Pattern -Based Software Design, Architectural Design, Mapping data flow into software architecture,

	Cohesion, Coupling, User interface analysis and Design
Unit 4	Unit Testing, Integration Testing, Validation Testing, System Testing, Art of Debugging, Software Testing Fundamentals, Black -Box Testing, White-Box Testing, Metrics for Source Code
Unit 5	Risk Management: Risk strategies, Software risks, Risk identification, Risk refinement, RMMM Quality Management: Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Review, Software Reliability, Change Management: Software Configuration Management, SCM Repository, SCM Process, Reengineering: Software reengineering, Reverse Engineering, Restructuring, Forward Engineering

Text Books-

1. Software Engineering-A Practitioner's Approach (Sixth Edition) by Roger Pressman (TMH)
2. Software Engineering (Ninth Edition) -Ian Summerville (Pearson)
3. Software Engineering for students (4th Edition) - Douglas Bell(Pearson)

Reference Books:

1. Schaum's Outline of Theory and Problems of Software Engineering by David Gustafson (TMH)
2. Software Engineering (Third Edition) by K. K. Aggarwal and Yogesh Singh (New age International Publishers)
3. Software Engineering, Theory and Practice(4th Edition) - Pfleeger, Atlee(Pearson)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

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SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Software Engineering & Project Management Lab **Subject code: BEIT501P**

Load	Practical	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Practical)	2	1	25	25	50

Aim: To develop quality software projects for given business system

Prerequisite(s): Basic Programming Knowledge

Course Objectives

1	To understand general idea of software engineering
2	To develop skills to understand creation of object and interaction between them
3	To develop skills required for creation of various UML models

Course Outcome:

At the end of this course students are able to:

CO1	Learn the concept of requirement gathering & to learn the development of use case model
CO2	Understanding the object creation and the interaction between various objects & their collaboration
CO3	Understanding various states of objects & different component views
CO4	Learning the development of various UML models & understanding the complete design phase.

List of Practicals:-

Ten Practicals based on the above syllabus.
Course coordinator should make sure that all units will be covered in their list. No study experiment should be included in the list.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

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SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Design and Analysis of Algorithms **Subject code: BEIT502T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3 Hrs (Theory)	02	1	3	30	70	100

Aim: To design the algorithms and analyze it for any real life problem.

Prerequisite(s): Data Structures, Programming Logic

Course Objectives:

1	Analyze the asymptotic performance of algorithm
2	Apply important algorithmic design paradigms and methods of analysis
3	Solve simple to moderately difficult algorithmic problems arising in applications.
4	Demonstrate the hardness of simple NP -complete problems

Course Outcome:

At the end of this course students are able to:

CO1	Illustrate different approaches for analysis and design of efficient algorithms and Analyze performance of various algorithms using asymptotic notations.
CO2	Determine and Apply various divide & conquer strategies and greedy approaches for solving a given computational problem
CO3	Demonstrate and Solve various real time problems using the concepts of dynamic programming
CO4	Make use of backtracking and graph traversal techniques for solving real -world problems
CO5	Recall and Classify the NP -hard and NP-complete problems
Unit 1	Definition of algorithms and brief explanation about the basic properties of algorithms Recurrence relations, solutions of recurrence relations using technique of characteristic equation, master theorem ,Asymptotic notations of analysis of algorithm s, worst case, average case and best case analysis of insertion sort, selection sort and bubble sort, amortized analysis, application of amortized analysis, Biotonic sorting network.

Unit 2	**Divide and conquer strategies**: Binary search, quick sort, merge sort, heap sort, Stressen's matrix multiplication algorithm, min-max algorithm. **Greedy Approach**: Application to job sequencing with deadlines problem, knapsack problem, optimal merge pattern, Huffman code, minimum cost spanning tree using Prim's and Kruskal's algorithm,
Unit 3	**Dynamic Programming**: Basic Strategy, Multistage graph (forward and backward approach), Longest Common Sub sequence, matrix chain multiplication, Optimal Binary Search Tree, 0/1 Knapsack problems, Traveling Salesman problem, single source shortest path using Bellman-Ford algorithm, all pair shortest path using Floyd - Warshall algorithm.
Unit 4	**Basic Traversal and Search Techniques** : Breadth first search and depth first search, connected components. **Backtracking**: Basic strategy, N-Queen Problem and their Analysis (4 & 8-Queen), graph coloring, Hamiltonian cycles .
Unit 5	NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's theorem, decision and optimization problems, graph based problems on NP Principle.

Text Books:-

1. "Introduction to Algorithms", Third Edition, Prentice Hall of India by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein
2. The Design and Analysis of Computer Algorithms", Pearson education by Alfred V. Aho, John E. Hopcraft, Jeffrey D. Ullman.
3. "Fundamentals of Computer Algorithms", Second Edition, University Press By Horowitz, Sahani, Rajasekharam
4. Fundamentals of Algorithms", Prentice Hall by Brassard, Bratley
5. "Design and Analysis of Algorithms",Pearson Education, II nd Edition, Parag Dave, Himanshu Dave

Reference Books:

1. Computer Algorithms: Introduction to Design and analysis, 3rd Edition, By Sara Baase and A.V. Gelder Pearson Education.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Java Programming **Subject code: BEIT503T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	—	3	30	70	100

Aim: To inculcate the Java programming concepts among the students in order to strengthen their programming logic and skills

Prerequisite(s): Basic programming Languages like C, C++ etc.

Course Objectives:

1	This course introduces fundamentals of object - oriented programming in Java, including creating, defining classes, invoking methods, using class libraries, collections frameworks
2	It is aimed at building software development skills using java programming for creating real world applications which can be also used as prerequisite to Mobile app development programming.
3	Use a development environment to design, code, test, and debug simple programs, including multi -file source projects using the concepts of pure object oriented programming.

Course Outcome:

At the end of this course students are able to:

CO1	Understand the basic data types and control flow constructs using J2SE.
CO2	Make use of various Object Oriented Concepts like inheritance, data hiding, Exception Handling etc., to implement various programs in Java
CO3	Understand the concepts of Multi threading & Multi programming
CO4	Implementation of String class, Date class, Time class and Calendar class in various micro projects
CO5	Understand the concepts of Collections Framework.

Unit 1	Introduction to data types, operators and control statements, Classes: fundamentals of classes, declaring objects, Assigning obj ects, reference variables, methods, constructor, variable handling. Methods and classes: Overloading methods, understanding static and final.
Unit 2	Introduction to Array, Vectors, Wrapper class & Inheritance, Packages and interface: Packages, access protection, importing packages, interfaces. Exception handling:
	Fundamentals exception types, uncaught exception, try-catch, displaying description of an exception, multiple catch clauses, nested try statements, throw, finally, built in exceptions, creating own exception subclasses
Unit 3	Multithreading: Fundamentals, Thread Life Cycle, Ways of creating threads, Creating multiple threads, isAlive (), join (), Thread Synchronization, Thread priorities, Interthread communication, Methods for suspending, resuming and stopping threads.
Unit 4	String class and its methods. Date, DateTime, Calendar class : Converting Date to String and String to Date using SimpleDateFormat class ,Object Class: Overriding to String, equals & hashcode method
Unit 5	Introduction to collections: Collection hierarchy List, Queue, Set and Map Collections List Collection: Array List, Linked List Vector (Insert, delete,search, sort, iterate, replace operations) Collections class : Comparable and Comparator interfaces Queue collection, Inner class (Regular, Method local, Anonymous & static inner class)

Text/Reference Books

Text Book:

1. Core and Advanced Java Black Book / Dreamtech Press

References:

1. Java 8 Programming Black Book / Dreamtech Press
2. Core Java : Volume 1 - Fundamentals by Cay S. Horstmann / Prentice Hall
3. Core Java : Volume 2 - Advanced Features by Cay S. Horstmann / Prentice Hall
4. Programming in Java by Sachin Malhotra, Saurabh Choudhary / Oxford University Press
5. Java The Complete Reference by Herbert Schildt / McGraw Hill
6. Core Java 8 for Beginners by Sharanam Shah, Vaishali Shah / Shroff Publishers
7. Murach's Java Programming by Joel Murach / Mike Murach
8. Object-Oriented Analysis and Design with applications by Grady Booch / Pearson
9. Object-Oriented Analysis and Design Using UML - An Introduction to Unified Process and Design Patterns by Mahesh P. Matha / PHI

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FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Java Programming Lab **Subject code: BEIT503P**

Load	Practical	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Practical)	2	1	25	25	50

Aim: To develop Java programs using java programming logic

Prerequisite(s): Basic programming Languages like C, C++ , Java Programming logic

Course Objectives:

1	This course introduces fundamentals of object - oriented programming in Java, including creating, defining classes, invoking methods, using class libraries, collections frameworks
2	It is aimed at building software development skills using java programming for creating real world applications which can be also used as prerequisite to Mobile app development programming.
3	Use a development environment to design, code, test, and debug simple programs, including multi -file source projects using the concepts of pure object oriented programming.

Course Outcome:

At the end of this course students are able to:

CO1	Understand the basic data types and control flow constructs using J2SE.
CO2	Make use of various Object Oriented Concepts like inheritance, data hiding, Exception Handling etc., to implement various programs in Java
CO3	Understand the concepts of Multi threading & Multi-programming
CO4	Implementation of String class, Date class, Time class and Calendar class in various micro projects
CO5	Understand the concepts of Collections Framework.

List of Practicals:-

Minimum 8 Practicals to be conducted based on Syllabus. (Maximum upto 10).

1	Program on function overloading
2	Program on inheritance , using method overriding and also using "this" keyword
3	Program to understand the concepts of Exception Handling
4	Program to create a user defined Exception
5	Demonstrate the life cycle of thread
6	Program on Multi Threading
7	Use of Vector class and ArrayList
8	String class methods
9	Implementation of any two collections class framework

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FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Theory of Computation **Subject code:BEIT504T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	2	1	3	30	70	100

Aim: To understand theory of computation for solving complex problems

Prerequisite(s): Basic programming Languages like C, C++, Data Structures

Course Objectives:

1	To understand the language hierarchy
2	To construct automata for any given pattern and find its equivalent regular expressions
3	To design a context free grammar for any given language
4	To understand Turing machines and their capability
5	To understand undecidable problems and NP class problems

Course Outcome:

At the end of this course students are able to:

CO1	Define what a Regular Language is and construct a finite state machine for it.
CO2	Construct equivalent representations among Regular Languages, Regular Expressions, and Regular Grammars.
CO3	Formulate the equations for push down automaton.
CO4	Identify the characteristics of problems for which no computational solution exists.
CO5	Understand the concepts of P vs. NP vs. NP-complete.

Unit 1	**AUTOMATA FUNDAMENTALS:** Introduction to formal proof, Additional forms of Proof, Inductive Proofs, Finite Automata, Deterministic Finite Automata, Non - deterministic Finite Automata, Finite Automata with Epsilon Transitions
Unit 2	**REGULAR EXPRESSIONS AND LANGUAGES:** Regular Expressions, FA and Regular Expressions, Proving Languages not to be regular, Closure Properties of Regular Languages, Equivalence and Minimization of Automata.
Unit 3	**CONTEXT FREE GRAMMAR AND LANGUAGES:** CFG, Parse Trees – Ambiguity in Grammars and Languages, Definition of the Pushdown Automata , Languages of a Pushdown Automata, Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.
Unit 4	**PROPERTIES OF CONTEXT FREE LANGUAGES:** Normal Forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, Programming Techniques for TM.
Unit 5	**UNDECIDABILITY:** Non Recursive Enumerable (RE) Language, Undecidable Problem with RE, Undecidable Problems about TM, Post's Correspondence Problem,

	The Class P and NP.

Text/Reference Books

1. Introduction to Languages and the Theory of Computation, 4th by John Martin, Tata Mc Graw Hill
2. Automata Theory, Languages, and Computation By John Hopcroft, Rajeev Motowani, and Jeffrey Ullman
3. Introduction to Automata Theory, Languages and Computation by J. E. Hopcraft,R. Motwani, J. D Ullman, second Edition, Pearson Education, Aisa
4. Theory of Computer Science, Automata, Languages and Computation by K. L. P. Mishra and N. Chandrasekaran, Third Edition, PHI Learning.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Gaming Architecture & Programming Subject code: (BEIT505T.1)

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	–	3	30	70	100

Aim: To understand process of Game design and development

Prerequisite(s): Computer Graphics

Course Objectives:

1	Understand the concepts of Game design and development.
2	Learn the processes, mechanics and issues in Game Design.
3	Be exposed to the Core architectures of Game Programming.
4	Know about Game programming platforms, frameworks and engines.
5	Learn to develop games.

Course Outcome:

At the end of this course students are able to:

CO1	Discuss the concepts of Game design and development.
CO2	Design the processes, and use mechanics for game development.
CO3	Explain the Core architectures of Game Programming.
CO4	Use Game programming platforms, frameworks and engines.
CO5	Create interactive Games.

Unit 1	Core Design: What Is a Game? Games Aren't Everything. Games Mean Gameplay. Creating the Game Spec. Example Game Spec, Initial Design: The Beginning . Hardware Abstraction. The Problem Domain. Thinking in Tokens.
Unit 2	Use of Technology: The State of the Art. Blue -Sky Research. Reinventing the Wheel. Use of object Technology, Building Bricks: Reusability in Software, Initial Architecture Design: The Birth of Architecture. The Tier System. Architecture Design.

Unit 3	Development: The Development Process. Code Quality. Coding Priorities. Debugging and Module Completion. The Seven Golden Gambits. The Three Lead Balloons. GAME PROGRAMMING: Technologies: Display, Mixing 2D and 3D, Direct X, User Interface code, Resource caching, the main loop.
Unit 4	Game scripting languages, Building the game and scripts, User interface programming and input devices: Getting the Device State, Working with the Mouse and Joystick, Working with the Keyboard, User Interface Components, More Control Properties. Basic 2D Drawing
	Concepts, Drawing Text, Working with Sprites, Graphics File Formats

Unit 5	Loading and Caching Game Resources: Art and Sound Formats, Resource Files, Data Compression, IPac: A Resource File Builder, the Resource Cache, World Design and Cache Prediction, 3D Graphics and 3D Engines: 3D Graphics Pipeline, Setting Up a Project, Using a Scene Graph, 3D Middleware Review, Rolling Your Own 3D Engine.

Text/Reference Books

1. Mike Mc Shaffrfy and David Graham, "Game Coding Complete", Fourth Edition, Cengage Learning, PTR, 2012.
2. Jason Gregory, "Game Engine Architecture", CRC Press / A K Peters, 2009.
3. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real- Time Computer Graphics" 2nd Editions, Morgan Kaufmann, 2006.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: High Performance Computing Architecture **Subject code: IT505T.2**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	-	3	30	70	100

Aim: To understand process of high performance computing and parallel programming

Prerequisite(s): Computer Architecture and Organization

Course Objectives:

1	To understand computer architecture and its trends.
2	To understand multiprocessing and parallelism.
3	To understand different multiprocessor architectures.
4	To understand Parallel Programming.

Course Outcome:

At the end of this course students are able to:

CO1	Learn the fundamentals of computer architecture, pipelining and multiprocessing environment.
CO2	Understand the different levels of parallelism .
CO3	Learn the design Issues in Parallel Computing environment.
CO4	Understand the importance of parallel programming .
CO5	Learn the impact of High-Performance Computing in recent developments.

Unit 1	Computer Architecture and its Trends: Moore's Law, Performance of Parallel Processors: Speedup and efficiency, Amdahl's law, Gustafson-Barsis's law, Karf-Flatt,metric, Isoefficiency metric. Pipelining: Basic concepts, instruction and arithmetic pipeline, data hazards, control hazards, and structural hazards, techniques for handling hazards, Processor Pipeline
Unit 2	Multi-Processing: Flynn's Taxonomy of parallel machines, Centralized and distributed memory, Message passing versus Shared Memory. Cache Coherence, Synchronization, Memory Consistency. Levels of parallelism (instruction, transaction, task, thread, memory, function), Models (SIMD, MIMD, Dataflow Models etc), Instruction Level Parallelism (IPL): techniques for increasing ILP, Superscalar and VLIW processor architectures, RAW and WAW dependencies.

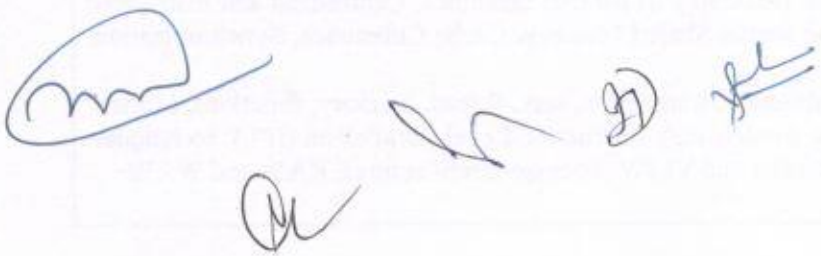
Unit 3	Multiprocessor architecture: taxonomy of parallel architectures, Architectures: N -wide, multi-core, multi-threaded. Design Issues in Parallel Computing : Synchronization, Scheduling, Job Partitioning, Types of dependencies loop and array dependencies, Loop dependence analysis, Solving diophantine equations, Program transformations, Performance Analysis of Parallel Algorithms.
Unit 4	Parallel Programming with CUDA: Processor Architecture, Interconnect,
	Communication, Memory Organization, and Programming Models in high performance computing architectures: (Examples: Nvidia Tesla GPU, Intel Larrabee and Intel Nehalem microarchitecture)
Unit 5	Petascale Computing ,Optics in Parallel Computing , Quantum Computers ,Case Study: Recent developments in Nanotechnology and its impact on HPC.

Text/Reference Books

1. David A. Bader (Ed.), Chapman & Hall/CRC, Petascale Computing: Algorithms and Applications,2007.
2. Hawang Kai and Briggs F. A., "Computer Architecture and Parallel Processing", McGraw Hill, 1993.
3. Jorden H. F. and Alaghaband G., "Fundamentals of Parallel Processing", Prentice Hall, 2002.
4. Kai Hwang, "Scalable Parallel Computing", McGraw Hill, 1998.
5. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability", McGraw Hill, 1993.
6. M. J. Quinn, "Parallel Programming in C with MPI and OpenMP", McGraw Hill, 2003.
7. Shasikumar M., "Introduction to Parallel Processing", PHI, 2006.

References:

1. D. E. Culler, J. P. Singh, A. Gupta, "Parallel Computer Architecture", Morgan Kaufman, 1998
2. John Paul Shen and Mikko H. Lipasti, Modern Processor Design: Fundamentals of Superscalar Processors, Tata McGraw-Hill.
3. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill.
4. M. J. Flynn, Computer Architecture: Pipelined and Parallel Processor Design, Narosa Publishing House.
5. William James Dally and Brian Towles, Morgan Kauffman , Principles and Practices on Interconnection Networks", 2004.



RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: HUMAN COMPUTER INTERFACE **Subject code:BEIT505T.3**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	-	3	30	70	100

Aim: To understand working of human computer interface

Prerequisite: Basic knowledge regarding computer, graphics and screen designs

Course Objectives:

1	Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2	Recognize how a computer system may be modified to include human diversity.
3	Select an effective style for a specific application.
4	Carry out the steps of experimental design, usability and experimental testing, and evaluation of human computer interaction systems
5	Design mock ups and carry out user and expert evaluation of interfaces
6	Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI.

Course Outcome:

At the end of this course students are able to:

CO1	Relate the importance of the Graphical user interface and popularity of the graphics
CO2	Interpret the importance of human characteristics in design and how people interact with computers.
CO3	Articulate and apply common design principles for making good decisions in the design of user interfaces.
CO4	Annotate various kinds of windows and their characteristics and have an ability to select the proper device based and screen based controls.
CO5	Apply different components that are available in the screens and various interaction devices which are used to interact with the computer.

Unit 1	**Introduction:** Importance of user Interface – definition, importance of good design, benefits of good design. A brief history of Screen design. **The graphical user interface –** popularity of graphics, the concept of direct
	manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics - Principles of user interface.
Unit 2	**Design process –** Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.
Unit 3	**Screen Designing :** Design goals – Screen planning and purpose,organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design
Unit 4	**Windows –** New and Navigation schemes selection of window, selection of devices based and screen based controls.
Unit 5	**Components –** text and messages, Icons and images – Multimedia, colors – uses, problems with choosing colors. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers

Text/Reference Books

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
3. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GREGORY'S, ABOWD, RUSSE

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Software Lab (Basics of AR & VR/Web Technology) Subject code:BEIT506 P

Load	Practical	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Practical)	2	1	25	25	50

Aim: To develop basic AR and VR applications and basic web sites

Prerequisite(s): Computer Graphics, Unity , Vuforia, HTML, CSS

Course Objectives:

1	To explore the concepts of Augmented and Virtual reality and develop basic AR and VR applications.
2	To develop basic web applications using HTML and CSS

Course Outcome:

At the end of this course students are able to:

CO1	Create and deploy AR and VR applications.
CO2	Learn the physical principles of VR.
CO3	Create a comfortable, high-performance VR application using Unity.
CO4	Develop dynamic web pages using JavaScript (client side programming).
CO5	Develop web pages using HTML, DHTML and Cascading Styles Sheets.

List of Practicals:-

Minimum 8 Practicals to be conducted based on Syllabus. (Maximum upto 10).

1	Installation of Unity and Visual Studio, setting up Unity for VR development, understanding documentation of the same.
2	Develop a scene in Unity that includes: i. a cube, plane and sphere, apply transformations on the 3 game objects. ii. add a video and audio source.
3	Develop Augmented reality based discovery-based learning applications
4	Develop Whole-Room Environment Augmentations:

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Effective Technical Communication **Subject Code: BTIT507T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Theory)	2	-	2	15	35	50

Aim: To develop effective technical communication for real world

Prerequisite(s): None

Course Objective: At the end of the semester, students will have enough confidence to face competitive examinations (IELTES/ TOEFL/CAT/ MAT/ XAT/SNAP/GMAT/GATE etc.) to pursue masters degree. They will also acquire language skills required to write their Reviews/Projects/Reports.They will be able to organize their thoughts in English and hence face job interviews more confidently.

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

1. Acquire knowledge of structure of language.
2. Be able to face competitive exams and the interview process and can become employable.
3. Develop business writing skills.
4. Become familiar with technology enabled communication and can develop technical and scientificwriting skills.

Unit 1. Functional Grammar:

Common errors, Transformation of Sentences- Change the Voice, Change the Narration, Simple, Compound Complex sentences, Use of Phrases, Idioms & Proverbs.

Unit II. English for Competitive Exams & Interview Techniques:

Word building, **English** words /phrases derived from otherlanguages, Prefixes and Suffixes, Synonyms/Antonyms, Technical Jargons, Verbal Analogies, Give one word for, Types & Techniques ofInterview.

5	Develop a scene in Unity that includes a sphere and plane . Apply Rigid body component, material and Box collider to the game Objects. Write a C# program to grab and throw the sphere using the vr controller.
6	Create an immersive environment (living room/ battlefield/ tennis court) with only static game objects. 3D game objects can be created using Blender or use available 3D models.
7	Create a HTML page, which has properly aligned paragraphs with images along with it.
8	Write a program to display a list of items in different styles. 3. Create both client side and server-side image maps.
9	Create your own style sheets and use them in your web page.,
10	Create a form with various fields and appropriate front and validations using any one of the scripting languages.
11	Write a program to store the form fields in a database, use any appropriate Server Side Scripting.

Text Book/References

1. Grigore C. Burdea, Philippe Coiffet , Virtual Reality Technology, Wiley 2016
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.
3. Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications, Foundations of Effective Design, Morgan Kaufmann, 2009.
4. John Vince, "Virtual Reality Systems ", Pearson Education Asia, 2007.
5. Anand R., "Augmented and Virtual Reality", Khanna Publishing House, Delhi

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FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE COURSE

SEMESTER: FIFTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Yoga and Meditation **Subject Code: BTIT508T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Theory)	2	-	-	Grade	--	Grade

Aim:

The purpose of this course is to learn the specific skills and/or the techniques of the activity. By actively participating in an activity class, the student may gain health benefits such as improved body composition, increased flexibility, increased muscular endurance and increased muscular strength. Participating in activity classes leads to a healthier lifestyle.

Prerequisite(s): No

Course Objectives:

1. Learn the rules, fundamentals, skills & strategies of yoga.
2. Teach various asanas (postures) using hatha yoga & the Iyengar method.
3. Learn breathing techniques.
4. Improve strength, flexibility and the sense of well-being.
5. Increase relaxation of body and soul.

Instructional Methodology:

This class is an activity and participation course; the specific task/exercise(s) for students to complete will be demonstrated. Students will then complete the task/exercise(s) to the best of their ability.

Curriculum:

1. Two: Basic yoga asanas, breathing techniques and relaxation exercises.
2. Continuation of learning asanas, breathing techniques, and relaxation exercises.
3. Instructions for final yoga routine will be distributed to students.
4. Continuation of learning more advanced asanas, breathing techniques, relaxation exercises andmeditation.

Unit III. Formal Correspondence

Business Letters, (Enquiry, Quotation, Order, Complaint), Job applications and ResumeWriting, e-mailetiquette, Writing Memorandum, Circulars, notices, Analytical comprehension

Unit IV. Technical & Scientific Writing:

Features of Technical Writing, Technical Report writing (Accident, Feasibility, Trouble, Progress), WritingScientific Projects, Writing Manuals, Writing Project Proposals, Writing Research papers.

Reference Books:

1. Effective technical Communication by Barun K. Mitra, Oxford University Press,
2. *Technical Communication-Principles and Practice* by Meenakshi Raman & Sharma, Oxford UniversityPress, 2011,
3. *Functional English for Technical Students* by Dr. Pratibha Mahato and Dr. Dora Thompson, HimalayaPublishing House
4. *How to Prepare a Research Proposal*: Guidelines for Funding and Dissertations in the Social andBehavioral Sciences by Krathwohl & R David
5. *Technical Writing- Process and Product* by Sharon J. Gerson & Steven M. Gerson, 3rd edition,PearsonEducation Asia, 2000
6. *Developing Communication* skills by Krishna Mohan & Meera Banerjee

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(Revised Curriculum as per AICTE Model Curriculum)

SCHEME OF EXAMINATION FOR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.) DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S.)

BRANCH: INFORMATION TECHNOLOGY

S. N.	Subject Code	Subject	Teaching Scheme			Evaluation Scheme			Credits	Categ
			L	T	P	CA	UE	Total		
1	BEIT601T	Data Base Management System	3	-	-	30	70	100	3	PCC
2	BEIT601P	Database Management System Lab	-	-	2	25	25	50	1	PCC
3	BEIT602T	Artificial Intelligence and Machine Learning	3	-	-	30	70	100	3	PCC
4	BEIT602P	Artificial Intelligence and Machine Learning Lab	-	-	2	25	25	50	1	PCC
5	BEIT603T	Elective – II	3	-	-	30	70	100	3	PEC
6	BEIT604T	Elective – III	3	-	-	30	70	100	3	PEC
7	BEIT605T	Open Elective- I	3	-	-	30	70	100	3	OEC
8	BEIT606P	Mini Project and Industrial Visit	-	-	6	25	25	50	3	Proje
9	BEIT607T	Economics of IT Industries	2	-	-	15	35	50	2	HSM
10	BEIT608T	Organizational Behavior	2	-	-					Audi
		Total	**19**	**00**	**10**	**240**	**460**	**700**	**22**	

Dr. M. V. Bramhe

(Dr. A. N. Thakare)

Dr. S. V. Sonekar
Chairman

S. J. Deote

(Prof. V. P. Thakare)

Elective –II (BEIT603 T)

1. Cluster & Grid Computing (BEIT603T.1)
2. Blockchain Technology (BEIT603T.2)
3. Advances in Computer Networks (BEIT603T.3)

Elective –III (BEIT604T)

1. Cloud Computing (BEIT604T.1)
2. Internet of Things(BEIT604 T.2)
3. Software Testing & Quality Assurance (BEIT604T.3)

Open Elective – I (BEIT605 T)

1. Data Science (BEIT605T.1)
2. Computer Animation (BEIT605T.2)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Database Management System **Subject code: BEIT601T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3(Theory)	3	–	3	30	70	100

Aim: To study Database Management System for back end development

Prerequisite(s): File Structure, Object Oriented Concepts

Course Objectives:

1	Learn the fundamental concepts of Database Management Systems
2	Acquire the knowledge of database query languages and transaction processing
3	Understand systematic database design approaches

Course Outcome:

At the end of this course students are able to:

CO1	Analyze and design Database Management System using ER model
CO2	Apply Indexing concepts in database languages
CO3	Implement database queries using database languages
CO4	Create normalized database design using normal forms
CO5	Apply Transaction Management concepts in real -time situations

Unit 1	Introduction: Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Database System Structure, Data Models. Database Design and ER Model: Entity, Attributes, Relationships, Constraints, Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E -R Features, converting ER and EER diagrams into tables.
Unit 2	File organization, Organization of records in files, Data dictionary storage, Basic concepts of indexing, ordered indices, B+ Tree index files, B+ Tree indexing, B+ Tree Extensions, Multiple Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices, Index Definition in SQL.
Unit 3	SQL and Advanced SQL Introduction to SQL : SQL Data Definition, Basic Structure of SQL Queries, DDL, DML, DCL, TCL, Set Operations, Null values, Aggregate functions, Nested Sub-queries, Modifications of the Databases Intermediate SQL: Join Expressions, Views, Integrity Constraints, SQL Data types and Schemas, Authorization.

Unit 4	Relational Model: Basic concepts, Attributes and Domains, CODD's Rules. Relational Integrity: Domain, Referential Integrities, Enterprise Constraints. Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Algorithms for Decomposition, 2NF, 3NF, BCNF.
Unit 5	Introduction to Database Transaction, Transaction states, ACID properties, Concept of Schedule, Serial Schedule. Seria lizability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules. Concurrency Control: Lock-based, Timestamp based Deadlock handling. Recovery methods: Shadow-Paging and Log-Based Recovery Checkpoints. Log-Based Recovery: Deferred Database Modifications and Immediate Database Modifications.

Text/Reference Books

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition
2. Connally T, Begg C., "Database Systems" , Pearson Education, ISBN 81-7808-861-4
3. C J Date, "An Introduction to Database Systems", Addison-Wesley, ISBN: 0201144719
4. S.K.Singh, "Database Systems: Concepts, Design and Application", Pearson Education, ISBN 978-81-317-6092-5
5. Ramez Elmasri and Shamkant Navathe, Database Systems -Models, Languages, Design and Application Programming

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FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Database Management System Lab **Subject code: BEIT601P**

Load	Practical	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Practical)	2	1	25	25	50

Aim: To acquire the knowledge of database queries & apply it in real life example.

Prerequisite: - Discrete Mathematics, Data Structures & Program Design

Course Objectives:

1	To understand the fundamental concepts of Database Management Systems
2	To acquire the knowledge of database query languages and transaction processing
3	To understand systematic database design approaches

Course Outcome:

At the end of this course students are able to:

CO1	Analyze and design Database Management System using ER model
CO2	Apply Indexing concepts in database languages
CO3	Implement database queries using database languages
CO4	Create normalized database design using normal forms
CO5	Apply Transaction Management concepts in real -time situations





List of Practicals:-

Minimum 8 Practicals to be conducted based on Syllabus. (Maximum upto 10).

1	ER Modeling and Normalization
2	SQL Queries: DDL
3	SQL Queries: DML
4	SQL Queries: TCL
5	SQL Queries – all types of Join, Sub-Query
6	PL/SQL Stored Procedure and Stored Function
7	Database Trigger
8	Database Connectivity
9	Mini Project

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FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Artificial Intelligence & Machine Learning **Subject code:BEIT602T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs(Theory)	3	-	3	30	70	100

Aim: To understand the basic concepts of Artificial Intelligence and Machine Learning

Prerequisite(s): Basic knowledge of computers and mathematics.

Course Objectives:

1	To Acquire advanced Data Analysis skills
2	To Create AI/ML solutions for various business problems.
3	To understand the basic theory underlying machine learning.
4	To understand a range of machine learning algorithms along with their strengths and weaknesses
5	To apply the algorithms to a real -world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

Course Outcome:

At the end of this course students are able to:

CO1	Understand the concept of Artificial Intelligence
CO2	Familiarize with Knowledge based AI systems and approaches
CO3	Apply the aspect of Probabilistic approach to AI
CO4	Identify the Neural Networks and NLP in designing AI models
CO5	Recognize the concepts of Machine Learning and its deterministic tools

Unit 1	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE:** History of artificial intelligence, The birth of artificial intelligence, AI Winters, Todays' AI, Historical milestones in the development of AI, Great contributors, People who have influenced AI , Differences between strong AI and weak AI, Artificial Intelligence definitions, Emergence of AI – Technological advances, Machine Learning, Deep Learning AI, Functions of AI, Characteristics of artificial intelligence, Applications of AI

Unit 2	**LOGICAL APPROACH TO AI AND KNOWLEDGE -BASED SYSTEM:** Introduction to knowledge representation systems, Knowledge representation using logic, Propositional logic, Semantics of propositional logic, Properties of propositional logic statements, Tautologies and logical implication, Resolution, Conjunctive normal form, Resolution is valid, Resolution algorithm, Knowledge base systems, Structure of a knowledge based system, Semantic networks: Types and components, Types of relationships in semantic network.
Unit 3	**PROBABILISTIC APPROACH TO AI:** Probability, Basic concepts, Probability of an event, Example on Sample Space, counting rules, Event relations, Conditional Probabilities, Defining Independence, Bayes' Rule, Bayesian Networks, Gaussian Bayesian Networks, Linear Gaussian BN to joint Gaussian, Theorem: From Gaussian
	to Bayesian networks, Noisy OR-Gate model, Promedas: A clinical diagnostic decision support system.
Unit 4	**EVOLUTIONARY INTELLIGENCE AND NEURAL NETWORKS, NATURAL LANGUAGE UNDERSTANDING:** Introduction, Artificial Neural Network, Appropriate problems for neural network learning, Characteristics of the problems, Types of feedforward networks, Multi -layer perceptron, Training MLP: The back - propagation algorithm, Multilayer networks and Backpropagation algorithm, The Backpropagation algorithm, Natural language processing, Classical NLP, Feed - forward networks, Recurrent neural networks and recursive networks, Features for NLP problems.
Unit 5	**INTRODUCTION TO MACHINE LEARNING AND LEARNING DETERMINISTIC MODELS:** Motivation for Machine Learning, Applications, Machine Learning, Learning associations, Classification, Regression, The Origin of machine learning, Uses and abuses of machine learning, Success cases, How do machines learn, Abstraction and knowledge representation, Classification of machine learning algorithms, General ML architecture, Group of algorithms, Reinforcement learning, Supervised learning, Unsupervised learning, Semi -Supervised learning Algorithms, Ensemble learning, Matching data to an appropriate algorithm, Supervised Learning, Regression.

Text/Reference Books

1. Artificial Intelligence (Third Edition) McGraw -Hill Elaine Rich, Kevin Knight.
2. Marco Gori , Machine Learning: A Constraint -Based Approach, Morgan Kaufmann. 2017
3. Ethem Alpaydin, Machine Learning: The New AI, MIT Press -2016

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FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Artificial Intelligence and Machine Learning Lab Subject code: BEIT602P

Load	Practical	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Practical)	2	1	25	25	50

Aim: To apply AI and ML algorithms for real life problems

Prerequisite: - Basic knowledge of computers, mathematics and programming languages

Course Objectives:

1	To understand the fundamental concepts of AI and ML
2	To develop programs based on AI and ML algorithms
3	To understand applications of AI and ML in real life

Course Outcome:

At the end of this course students are able to:

CO1	Understand the concept of Artificial Intelligence
CO2	Familiarize with Knowledge based AI systems and approaches
CO3	Apply the aspect of Probabilistic approach to AI
CO4	Identify and apply Neural Networks and NLP in designing AI models
CO5	Recognize the concepts of Machine Learning and its deterministic tools

Practical :- Minimum 8 practicals based on the syllabus of AI and ML

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SEVENTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Cluster and Grid Computing **Subject code: BEIT603T.1**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	–	3	30	70	100

Aim: To study working of Cluster and Grid Computing

Prerequisite: - Basic knowledge of computers, networking, operating system

Course Objectives:

1	To understand the cluster and grid computers.
2	To understand task scheduling and resource allocation in cluster and grid environments.
3	To understand middleware architecture in Cluster and Grid Environment .

Course Outcome:

At the end of this course students are able to:

CO1	Learn the fundamentals of the cluster computing environment.
CO2	Understand the different features of clustering systems.
CO3	Learn the fundamentals of the grid computing environment.
CO4	Understand different features of grid systems.
CO5	Adopt basic services like resource management, process scheduling, etc.

Unit 1	Introduction to Cluster Computing, Cluster Middleware: An Introduction, Early Cluster Architecture and High Throughput Computing Clusters, Networking, Protocols and I/O for Clusters
Unit 2	Cluster Technology for High Availability , Process Scheduling, Load Sharing and Load Balancing, Distributed Shared Memory
Unit 3	Introduction to Grid Architecture, Characterization of Grid, and Grid related standard bodies, Grid types, Topologies, Components and Layers
Unit 4	System Infrastructure, Traditional paradigms for distributed computing, Web Services, Grid standards: OGSA and WSRF
Unit 5	Basic Services: Grid Security, Grid Monitoring, GMA, Grid Scheduling and Resource Management: Scheduling Paradigms, working of Scheduling Paradigms

Text/Reference Books

1. Grid and Cluster Computing, Prabhu C.S.R, PHI Learning Private Limited
2. The Grid (Chapter 1, 2, 3, 4, 5) Core Technologies by Maozhen Li, Mark Baker (John Wiley and Sons)
3. A networking Approach to Grid Computing by Daniel Minoli (Chapter 1) (John Wiley and Sons, INC Publication)
4. High Performance Cluster Computing: Architectures and Systems, Vol. 1, Prentice Hall
5. Distributed Systems: Principles and Paradigms, Second Edition, Andrew S. Tanenbaum, Maarten Van Steen, Person Education.

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FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Blockchain Technology **Subject code: BEIT603T.2**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	-	3	30	70	100

Aim: To study working of Blockchain Technology

Prerequisite: - Basic knowledge of computers, mathematics and Cryptography

Course Objectives:

1	To explore various aspects of Blockchain technology like application in various domains.
2	To design, build, and deploy smart contracts and distributed applications
3	To integrate ideas from blockchain technology into their own projects.

Course Outcome:

At the end of this course students are able to:

CO1	Understand and explore the working of Blockchain technology
CO2	Understand how blockchain systems (mainly Bitcoin and Ethereum) work
CO3	Analyze the working of Smart Contracts
CO4	Understand and analyze the working of Hyperledger
CO5	Apply the learning of solidity and de -centralized apps on Ethereum and understand the application of blockchain Technology

Unit 1	Introduction of Cryptography and Blockchain: What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain.
Unit 2	BitCoin and Cryptocurrency: What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double -Spend Problem, Blockchain And Digital Currency, Transactional Blocks, Impact Of Blockchain Technology On Cryptocurrency?

Unit 3	Introduction to Ethereum: What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction?, Smart Contracts.

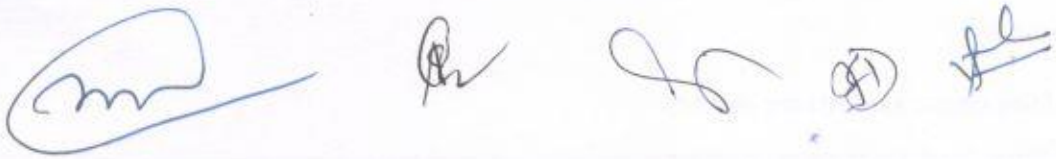
Unit 4	Introduction to Hyperledger: What is Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer
Unit 5	Solidity Programming: Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.

Text Books

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Reference Books:

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4. Nicola Atzei , Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts



RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Advances in Computer Networks **Subject code : BEIT603T.3**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	–	3	30	70	100

Aim: To understand the advancement in computer networking field

Prerequisite: - Computer Networks

Course Objectives:

1	To become familiar with the basics of Advances in Computer Networks.
2	To understand the protocols and their functionalities
3	To understand the requirements for the future Internet and its impact on the computer network architecture.

Course Outcome:

At the end of this course students are able to:

CO1	Develop an understanding of advances in computer networking.
CO2	Learn various Fast access technologies
CO3	Comprehend the features of IPv6.
CO4	Demonstrate various security protocols.
CO5	Interpret advances in computer network authentication.

Unit 1	**Introduction:** Overview of computer networks, seven layer architecture, TCP/IP suite of protocols, etc. MAC protocols for high speed LANs, MANs, and wireless LANs. (for example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)
Unit 2	**Fast access technologies:** ADSL, Cable Modem, etc.) ATM Networks. ATM layer. ATM Adaptation Layers. **Congestion control:** Signaling, Routing, QoS support, Neighbor discovery, Auto configuration. Changes to other protocols.
Unit 3	**IPv6:** Basics of IPv4, Why IPv6, basic protcol, exte nsions and options, support for QoS, security, etc., neighbour discovery, auto-configuration, routing. Changes to other protocols. Application Programming Interface for IPv6. 6Bone. Mobility in networks.

	Mobile IP.
Unit 4	**Security :** Security related issues. IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc. TCP extensions for high speed networks,
	transaction oriented applications. Other new options in TCP. Network security at various layers.
Unit 5	**TCP :**TCP extensions for high-speed networks, transaction-oriented applications. Other new options in TCP. Network security at various layers. Secure -HTTP, SSL, ESP, Authentication header, Key distribution protocols. Digital signatures, digital certificates.

Text/Reference Books

1. W. Stallings.*Cryptography and Network Security: Principles and Practice,* 2nd Edition, Prentice Hall, 1998.
2. R. Handel, M. N. Huber, and S. Schroeder.*ATM Networks: Concepts, Protocols, Applications,*Addison Wesley, 1998.
3. W. R. Stevens.*TCP/IP Illustrated, Volume 1,2 : The protocols,* Addison Wesley, 1994.
4.W. R. Stevens.*TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, and the Unix Domain Protocols,* Addison Wesley, 1996.
5. C. E. Perkins, B. Woolf, and S. R. Alpert. *Mobile IP: Design Principles and Practices,* Addison Wesley, 1997.
6. Peter Loshin.*IPv6 Clearly Explained,* Morgan Kauffman, 1999.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Cloud Computing **Subject code: BEIT604T.1**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	–	3	30	70	100

Aim: To study the working and applications of Cloud Computing

Prerequisite: - Basic knowledge of computers, networking and database storage

Course Objectives:

1	To study fundamental concepts of cloud computing
2	To understand the implementation of Virtualization in Cloud Computing
3	To learn the application and security on cloud computing

Course Outcome:

At the end of this course students are able to:

CO1	Understand the different Cloud Computing environment
CO2	Analyze virtualization technology and install virtualization software
CO3	Use appropriate data storage technique on Cloud, based on Cloud application
CO4	Apply security in cloud applications
CO5	Use advance techniques in Cloud Computing

Unit 1	Introduction: Importance of Cloud Computing, Characteristics, Pros and Cons of Cloud Computing, Migrating into the Cloud, Seven -step model of migration into a Cloud, Trends in Computing. Cloud Service Models: SaaS, PaaS, IaaS, Storage. Cloud Architecture: Cloud Computing Logical Architecture, Developing Holistic Cloud Computing Reference Model, Cloud System Architecture, Cloud Deployment Models.
Unit 2	Introduction to Virtualization : Definition of Virtualization, Adopting Virtualization, Types of Virtualization, Virtualization Architecture and Software, Virtual Clustering, Virtualization Application, Pitfalls of Virtualization. Grid, Cloud and Virtualization: Virtualization in Grid, Virtualization in Cloud, Virtualization and Cloud Security. Virtualization and Cloud Computing: Anatomy of Cloud Infrastructure, Virtual infrastructures, CPU Virtualization, Network and Storage Virtualization.
Unit 3	Cloud Storage: Data Management, Provisioning Cloud storage, Data Intensive Technologies for Cloud Computing. Cloud Storage from LANs to WANs: Cloud Characteristics, Distributed Data Storage.

Unit 4	Risks in Cloud Computing: Risk Management, Enterprise -Wide Risk Management, Types of Risks in Cloud Computing. Data Security in Cloud: Security Issues, Challenges, advantages, Disadvantages, Cloud Digital persona and Data security, Content Level Security. Cloud Security Services: Confidentiality, Integrity and Availability, Security Authorization Challenges in the Cloud, Secure Cloud Software Requirements, Secure Cloud Software Testing.
Unit 5	Future Trends in Cloud Computing, Mobile Cloud, Automatic Cloud Computing: Comet Cloud. Multimedia Cloud: IPTV, Energy Aware Cloud Computing, Jungle Computing, Distributed Cloud Computing Vs Edge Computing, Containers, Docker, and Kubernetes, Introduction to DevOps. IOT and Cloud Convergence: The Cloud and IoT in your Home, The IOT and cloud in your Automobile, PERSONAL: IoT in Healthcare.

Text/Reference Books

1. A.Srinivasan, J. Suresh, "Cloud Computing: A Practical Approach for Learning and Implementation", Pearson, ISBN: 978-81-317-7651-3
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education, ISBN-13:978-1-25-902995-0
3. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach" McGraw Hill
4. Tim Mather, Subra K, Shahid L.,"Cloud Security and Privacy", Oreilly, ISBN-13 978- 81- 8404-815-5
5. Dr. Kris Jamsa, "Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more", Wiley Publications, ISBN: 978 -0-470-97389-9

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Internet of Things **Subject code: BEIT604T.2**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	-	3	30	70	100

Aim: To study working of Internet of Things

Prerequisite: - Basic knowledge of hardware, Micro controller, computer networks

Course Objectives:

1	To study fundamental concepts of IoT
2	To summarize different protocols used for IoT design
3	To study the role of big data, cloud computing and data analytics in a typical IoT system.

Course Outcome:

At the end of this course students are able to:

CO1	Summarize the various concepts, terminologies and architecture of IoT systems.
CO2	Identify and apply sensors & protocols for design of IoT systems
CO3	Analyze various techniques of data storage and analytics in IoT
CO4	Illustrate various applications of IoT
CO5	Correlate Real world IoT Design constraint.

Unit 1	**Fundamentals of IoT** : Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks.
Unit 2	**Sensors Networks** : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, Raspberry Pi Development Kit, RFID **IP Based Protocols for IoT:** IPv6, 6LowPAN, RPL, REST, AMQP, CoAP, MQTT. Edge connectivity and protocols

Unit 3	**Data Handling & Analytics** : Introduction, Big Data, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud Analytics and applications
Unit 4	**Applications of IoT** : Home Automation, Smart Cities, Energy, Retail Management,
	Logistics,Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.
Unit 5	**Cloud Analytics for IoT Application:** Introduction to cloud computing, Difference between Cloud Computing and Fog Computing: The Next Evolution of Cloud Computing, Role of Cloud Computing in IoT, Connecting IoT to cloud, Cloud Storage for IoT Challenge in integration of IoT with Cloud.

Text Books:

1. Hakima Chaouchi, — "The Internet of Things Connecting Objects to the Web" ISBN : 978-1- 84821-140-7, Wiley Publications
2. Olivier Hersent, David Boswarthick, and Omar Elloumi, — "The Internet of Things: Key Applications and Protocols", WileyPublications
3. Vijay Madisetti and ArshdeepBahga, — "Internet of Things (A Hands-on- Approach)", 1st Edition, VPT, 2014.
4. J. Biron and J. Follett, "Foundational Elements of an IoT Solution" , O'Reilly Media, 2016.

Reference Books:

1. Daniel Minoli, — "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 stEdition, Apress Publications, 2013.
4. Cassimally, Hakim, "Designing the Internet of Things", Wiley Publications.
5. Keysight Technologies, "The Internet of Things: Enabling Technologies and Solutions for Design and Test", Application Note, 2016.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name:Software Testing & Quality Assurance **Subject code: BEIT604T.3**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs(Theory)	3	-	3	30	70	100

Aim: To understand the need and working of software testing for quality of software

Prerequisite: - Software Engineering

Course Objectives:

1	To understand basic idea of software testing
2	To learn system test categories and design methods
3	To develop skills required to improve software quality

Course Outcome:

At the end of this course students are able to:

CO1	Understand need of testing and issues in testing
CO2	Know unit testing and debugging including tools for Unit Testing
CO3	Analyze data flow testing and system integration
CO4	Analyze various system test categories and design methods
CO5	Apply Acceptance testing to improve software quality with effecting testing

Unit 1	**Basic concepts of Testing:** Need of Testing, Basic concepts- errors, faults, defects,failures, objective of testing, central issue in testing, Testing activities, V - Model, Sources of information for test cases, Monitoring and Measuring Test Execution, Test tools and Automation, Limitation of Testing.
Unit 2	**Unit Testing:** Concepts of Unit Testing, Static Unit Testing, Defect Prevention, Dynamic Unit Testing, Mutation Testing, Debugging, Unit Testing in Extreme Programming, Tools for Unit Testing.

Unit 3	**Data Flow and System Integration Testing** : Introduction Data flow testing, Data flow graph, Data flow testing criteria, Comparison of Data flow test selection criteria. **Fundamentals of System Integration** : Types of interfaces and interface errors, System integration testing, Software and Hardware integration, Test plan, Off -the
	shelf
	component integration and testing
Unit 4	**System Test Categories and Test Design** : Taxonomy of system test, Basic Test, Functionality test, Robustness test, Performance test, Scalability test, Stress test, Load and Stability test, Reliability test, Regression test, Documentation Test. Test Design: Test cases, Necessity of test case documentation, Test case design methods, Functional specification based test case design, Use case bases, Application based test case design,Level of test execution.
Unit 5	**Acceptance Testing and Software Quality:** Types of acceptance testing, Acceptance criteria, Acceptance test plan and execution, fire view of software quality, ISO -9126 quality characteristics, ISO -9000:2000 software quality standard, ISO - 9000:2000 fundamentals

Text Books-

1. Software Testing and Quality Assurance by Kshirsager Naik and Priyadarshini Tripathi (Wiley)
2. Software Testing Concepts and Tools by Nageswara Rao Pusuluri (Dream Tech Press)
3. Software Testing Principles, Techniques and tools, 1st Edition, by M. G. Lim aye McGraw Hills

Reference Books:

1. "Foundations of Software Testing" 2E by Aditya P. Mathur , Pearson Education
2. Effective Methods for Software Testing - William E Perry, (Wiley). 2.

Software Testing Tools by Dr. K. V. K. K. Prasad (Dream Tech)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Data Science **Subject code: BEIT605T.1**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	-	3	30	70	100

Aim: To study Data Science and Data Engineering

Prerequisite: - Mathematics, Statistic, Artificial Intelligence, Database Systems

Course Objectives:

1	To acquire skills in data preparatory and prepossessing steps
2	To learn the tools and packages in Python for data science
3	To acquire knowledge in data interpretation and visualization techniques

Course Outcome:

At the end of this course students are able to:

CO1	Apply quantitative modeling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data science tools
CO2	Apply principles of Data Science to the analysis of business problems.
CO3	Apply ethical practices in everyday business activities and make well -reasoned ethical business and data management decisions
CO4	Demonstrate knowledge of statistical data analysis techniques utilized in business decision making
CO5	Apply algorithms to build machine intelligence

Unit 1	**Introduction to Data Science** Need for data science benefits and uses facets of data data science process setting the research goal retrieving data cleansing integrating and transforming data exploratory data analysis build the models presenting and building applications

Unit 3	**Data Flow and System Integration Testing** : Introduction Data flow testing, Data flow graph, Data flow testing criteria, Comparison of Data flow test selection criteria. **Fundamentals of System Integration** : Types of interfaces and interface errors, System integration testing, Software and Hardware integration, Test plan, Off -the
	shelf
	component integration and testing
Unit 4	**System Test Categories and Test Design** : Taxonomy of system test, Basic Test, Functionality test, Robustness test, Performance test, Scalability test, Stress test, Load and Stability test, Reliability test, Regression test, Documentation Test. Test Design: Test cases, Necessity of test case documentation, Test case design methods, Functional specification based test case design, Use case bases, Application based test case design,Level of test execution.
Unit 5	**Acceptance Testing and Software Quality:** Types of acceptance testing, Acceptance criteria, Acceptance test plan and execution, fire view of software quality, ISO -9126 quality characteristics, ISO -9000:2000 software quality standard, ISO - 9000:2000 fundamentals

Text Books-

1. Software Testing and Quality Assurance by Kshirsager Naik and Priyadarshini Tripathi (Wiley)
2. Software Testing Concepts and Tools by Nageswara Rao Pusuluri (Dream Tech Press)
3. Software Testing Principles, Techniques and tools, 1st Edition, by M. G. Lim aye McGraw Hills

Reference Books:

1. "Foundations of Software Testing" 2E by Aditya P. Mathur , Pearson Education
2. Effective Methods for Software Testing - William E Perry, (Wiley). 2.
Software Testing Tools by Dr. K. V. K. K. Prasad (Dream Tech)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY,

NAGPUR FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Computer Animation **Subject code: BEIT605T.2**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
3Hrs (Theory)	3	–	3	30	70	100

Aim: To study computer animation for real life problems

Prerequisite: - Computer Graphics

Course Objectives:

1	To use basic 3D modeling techniques
2	To use basic shading, rendering, texturing, and lighting techniques
3	To apply animation concepts learned in fundamentals of animation to a 3D environment
4	To create a short 3D animation

Course Outcome:

At the end of this course students are able to:

CO1	Understand, identify and design art relating to that particular artwork in the given time frame
CO2	Apply the concepts of animation using Maya
CO3	Understand and apply 3D animation concepts
CO4	Summarize various formats and effects of motion capture
CO5	Relate and apply the features of animation and VFX for animated application

Unit 1	What is mean by Animation – Why we need Animation – History of Animation – Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.
Unit 2	Introduction to Maya: Keyframe animation, application of Maya in the film, television and game industries. Introduction to the interface of Maya. Hotkeys. Using the spacebar.Manipulating a view. Creating objects. Simple primitives. Light s, cameras, selecting objects, types of selection- single selection, adding and subtracting selection, edit menu selection options. Marquee selection, Lasso selection, selection mask.

Unit 2	**Mathematical Foundations for Data Science** Basics of Data Science: Introduction; Typology of problems; Importance of linear algebra, statistics and optimization from a data science perspective; structured thinking for solving data science problems. Linear Algebra: Matrices and their properties (determinants, traces, rank, nullity, etc.); Eigenvalues and eigenvectors; Matrix factorizations; Inner

	products; Distance measures; Projections; Notion of hyperplanes; half -planes. Probability, Statistics and Random Processes: Probability theory and axioms; Random variables; Probability distributions and density functions (univariate and multivariate); Expectations and moments; Covariance and correlation; Statistics and sampling distributions; Hypothesis testing of means, proportions, variances and correlations; Confidence (statistical) intervals; Correlation functions; White-noise process.Optimization: Unconstrained optimization; Necessary and sufficient conditions for optima; Gradient descent methods; Constrained optimization, KKT conditions; Introduction to non -gradient techniques; Introduction to least squares optimization; Optimization view of machine learning.Introduction to Data Science Methods: Linear regression as an exemplar function approximation problem; Linear classification problems.
Unit 3	**PYTHON FOR DATA HANDLING** Basics of Numpy arrays aggregations computations on arrays comparisons masks boolean logic fancy indexing structured arrays Data manipulation with Pandas data indexing and selection operating on data missing data hierarchical indexing combining datasets – aggregation and grouping – pivot tables
Unit 4	**PYTHON FOR DATA VISUALIZATION** Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings, and density – three dimensional plotting – geographic data – data analysis using statsmodels and seaborn – graph plotting using Plotly – interactive data visualization using Bokeh
Unit 5	**Advanced Data Analysis** Decision Trees: What Is a Decision Tree? Entropy, The Entropy of a Partition, Creating a Decision Tree, Random Forests Neural Networks : Perceptrons, Feed-Forward Neural Networks, Backpropagation, Example: Defeating a CAPTCHA MapReduce : Why MapReduce? Examples like word count and matrix multiplication

Text/Reference Books

1. Data Science from Scratch : Joel Grus, O'Reilly Media Inc., ISBN: 9781491901427
2. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016.
3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016
4. Practical Data Science Andreas François Vermeulen APress

Unit 3	3D Animation & its Concepts – Types of 3D Animation – Skeleton & Kinetic3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.
Unit 4	Motion Caption – Formats – Methods – Usages – Expression – Motion Capture Software – Script Animation Usage – Different Language of Script Animation Among the Software.
	Visual Effects - Description- Types- Particles – Analysis- Size- Sand Effects – Smoke Effects- Fire Effects – Cloud Effects – Snow Effects
Unit 5	Animation & VFX Around the World , Concept Development –Story Developing – Audio & Video – Color Model –Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

Text/Reference Books

1. Compositing Visual Effects: Steve Wright
2. Digital Compositing for Film and Video: Focal Press

NAGPUR FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Mini Project & Industrial Visit **Subject code: BEIT606P**

Load	Practical	Credits	College Assessment Marks	University Evaluation	Total Marks
6Hrs (Practical)	6	3	25	25	50

Aim: To develop software projects and have industrial exposure

Prerequisite: - Software Engineering , Programming skills, Database systems

Course Objective:

1	To develop software development and research skills in students
2	To develop project management skills in students
3	To develop professionalism in students through industry exposure

Course Outcome:

At the end of this course students are able to:

CO1	Summarize past research in the field through literature review
CO2	Analyze user requirements and design the system as per requirements
CO3	Develop, test and deploy the system in user environment

Project Development and Industrial Visit Procedure :

1. Students shall work in group of 4-5 each and work on small application or research based / Industry Oriented real time problems.
2. College Mentor and Industry mentor shall work in coordination.
3. Industry visit should be planned to explore students about real time problems.
4. Students shall use Agile framework for project development
5. Project report should be based on Agile Framework .
6. Evaluation should be done based on feedback of College and Industry Mentor.

Text / 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.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Economics of IT Industries **Subject code: BEIT607T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Theory)	2	–	2	15	35	50

Aim: To study economy of IT industries

Prerequisite: - None

Course Objective:
To make learners aware about the impact of Information Communication technology (ICT) and Information Technology (IT) revolution on Indian Economy and their seamless interaction.

Course Outcome:
At the end of this course students are 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.

Syllabus:

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 oftop 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

Text / 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.

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FOUR YEAR BACHELOR OF TECHNOLOGY (B. Tech.)DEGREE COURSE

SEMESTER: SIXTH (C.B.C.S)

BRANCH: INFORMATION TECHNOLOGY

Subject Name: Organizational Behaviour **Subject code: BEIT608T**

Load	Lecture	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
2Hrs (Theory)	2	–	-	Grade	-	Grade

Aim: To study working and interpersonal behaviour in organization

Prerequisite: - None

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

Course Outcomes: At the end of this 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

Syllabus:

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, personalitytraits.

Unit 4: Introduction to Motivation and leadership.

Concept and importance of motivation,Maslow's two factor theory of motivation. Significance ofmotivation 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.