Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

An Autonomous Institute Affiliated to RTM Nagpur University

SCHEME OF INSTRUCTION & SYLLABI

Programme: Computer Science & Engineering

Scheme of Instructions: Final Year B. Tech. in Computer Science & Engineering

Semester – VII

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	**PCC**	**BCS4701**	Distributed Operating System	3	-	-	3	3	15	15	10	60	100
2	**PCC**	**BCS4702**	Information & Computer Security	3	-	-	3	3	15	15	10	60	100
3	**PCC**	**BCS4703**	Distributed Operating System Lab	-	-	2	2	1	-	-	25	25	50
4	**PCC**	**BCS4704**	Information & Computer Security Lab	-	-	2	2	1	-	-	25	25	50
5	**PROJ**	**BCS4705**	Seminar based on Emerging Courses*	-	-	2	2	2	-	-	25	25	50
6	**PEC**	**BCS4706-09**	Professional Elective-V	3	-	-	3	3	15	15	10	60	100
7	**PEC**	**BCS4710-13**	Professional Elective-VI	3	-	-	3	3	15	15	10	60	100
8	**OEC**	**B$$XX01-14**	Open Elective-III	3	-	-	3	3	15	15	10	60	100
9	**OEC**	**B$$XX01-14**	Open Elective-IV	3	-	-	3	3	15	15	10	60	100
10	**MCC**	**BAU4707**	Behavioral and Interpersonal Skills	2	-	-	2	Audit	-	-	-	-	-
			Total	**20**	**-**	**6**	**26**	**22**	**90**	**90**	**135**	**435**	**750**

***There will be two presentations, based on seminar topic to be selected in consultation with guide preferably based on emerging trends.**

L- Lecture T-Tutorial P-Practical
CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment
CT2- Class Test 2 ESE- End Semester Examination (For Laboratory End Semester performance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	Project / Seminar / Industrial Training	MCC (Mandatory Courses)
Credits	--	--	--	08	06	06	02	Yes
Cumulative Sum	06	26	18	59	18	12	06	--

PROGRESSIVE TOTAL CREDITS: 123+22 =145

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Principal Tulsiramji Gaikwad-Patil College Of Engineering &

Fourth Year B. Tech (Seven Semester)				
BCS4701: Distributed Operating System				
Teaching Scheme			**Examination Scheme**	
Lectures	4 Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits: 4			**Duration of Exam:** 3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	To Understand Distributed OS. like models, features, concept, design issues and foundation of distributed systems.
2.	To Understand distributed mutual exclusion.
3.	To Analyze the deadlock detection and Distributed scheduling of distributed OS.
4.	Have Sufficient knowledge about file access and distributed shared memory.

Course Outcomes	
At the end of the unit, students will be able to:	
BCS4701.1	**Understand** concept, design issues and foundation of distributed systems.
BCS4701.2	**Demonstrate** distributed mutual exclusion.
BCS4701.3	**Analyze** the deadlock detection and Distributed scheduling of distributed OS.
BCS4701.4	**Discuss** file access and distributed shared memory.
BCS4701.5	**Identify** fault tolerance and failure recovery.

Course Contents	
Unit I	**Fundamentals:** Introduction, Models and Features, Concept of Distributed Operating system, Issues in Design of a Distributed Operating System. **Foundations of Distributed System:** Limitations of Distributed Systems, Lamport's logical clocks, Vector clocks, Causal ordering of messages, Global state recording, Cuts of a Distributed Computation, Termination Detection.
Unit II	**Distributed Mutual Exclusion:** Requirement of Mutual Exclusion Algorithm, Non-Token Based Algorithms, Token Based Algorithms, Comparative Performance Analysis.
Unit III	**Distributed Deadlock Detection:** Introduction, Deadlock Handling strategies in Distributed System, Centralized and Distributed Deadlock Detection Algorithms. **Distributed Scheduling:** Introduction, Issues in Load Distributing, Components of a Load Distributing Algorithm, Load Distributing Algorithms.
Unit IV	**Distributed File system:** Introduction to Distributed File System, Architecture, and Mechanism for Building Distributed File System. **Distributed Shared Memory:** General Architecture of DSM systems, Memory coherence and Coherence Protocols.
Unit V	**Failure Recovery:** Recovery in concurrent systems, Consistent set of Checkpoints, Synchronous check pointing and Recovery, Asynchronous check

	pointing and Recovery. **Fault Tolerance:** Introduction, Commit Protocols, Static Voting Protocol, Dynamic Voting Protocol.

Text Books	
T.1	Advanced Concepts in Operating Systems, Mukesh Singhal and Niranjan Shivaratri, Tata McGraw Hill, 2001.
T.2	Distributed Systems - Concepts and Design, Coulouris, Dollimore and Kindberg, 5th Edition, Addison-Wesley, 2012.
Reference Books	
R.1	Distributed Operating System, Andrew S. Tanenbaum, Pearson Education, 2003.

Useful Links	
1	https://nptel.ac.in/courses/106/106/106106168/
2	https://onlinecourses.nptel.ac.in/noc21_cs87/preview

Course Coodinator H.O.D

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics
Tulsiramji Gaikwad-Patil
College Of Engineering
and Technology, Nagpur

Fourth Year B.Tech (Seven Semester)				
BCS4702: Information & Computer Security				
Teaching Scheme			**Examination Scheme**	
Lectures	4 Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits: 4			**Duration of Exam :** 3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	Explain the objectives of information security
2.	Discover and explain various authentication and authorization methods with the access control
3.	Learners must be able to apply various cryptographic techniques to secure the systems developed
4.	Discuss Web security and Firewalls

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4702.1	**Understand** the need of Information Security, OSI Security Architecture, Conventional Encryption
BCS4702.2	**Analyze** of various cryptography algorithms, key management.
BCS4702.3	**Understand** the concepts of message Authentication and Hash Functions, Public Key Infrastructure-Functions, PKI Architecture, Certificate Authentication.
BCS4702.4	**Evaluate** different Network Security.
BCS4702.5	**Adapting** software vulnerability, Electronic Payment, Electronic Mail Security

Course Contents	
Unit I	**Need of Information Security:** Introduction, History of Information security, Attributes of security- authentication, access control, confidentiality, authorization, integrity, non-reproduction. **OSI Security Architecture:** attacks, services and mechanisms. Security Attacks, Security services, A model of Internetwork Security. **Conventional Encryption:** Classical Encryption Techniques and Problems on classical ciphers, Security architecture.
Unit II	**Introduction to Secret key and cryptography:** Encrypt given messages using DES, AES, IDEA, Problems on cryptography algorithms, Principles, finite fields, stream cipher, block cipher modes of operation, DES, Triple DES, AES, IDEA, RC5, key distribution. **Introduction to Public key and Cryptography:** Encrypt given messages using ECC, Problems on key generation, cryptography algorithms Principles, Introduction to number theory, RSA- algorithm, security of RSA, Key management- Diffie-Hellman key exchange, man-in-the-middle attack, Elliptical curve cryptography

Unit III	**Message Authentication and Hash Functions:** Authentication Requirements and Functions, Hash Functions and their Security, MD5 Message Digest Algorithm, Kerberos. **Key Management**: Digital Certificates-Certificate types, X.509 Digital Certificate format, Digital Certificate in action, Certificate Authentication.
Unit IV	**Introduction to Network Security:** Network, Transport and Periphery Security, Study of IPSEC, TLS, and SSL. Firewalls - design principles, trusted systems, Intrusion Detection System, Intrusion Prevention System. Implementation and analysis of IPSEC, TLS and SSL, Introduction to cryptography - Classical cryptography.
Unit V	**Software Vulnerability:** Phishing, Buffer Overflow, Cross-site Scripting (XSS), SQL Injection. **Electronic Payment**: Payment Types, Enabling Technologies-Smart Cards and Smart Phones, Cardholder Present E-Transaction-Attacks, Chip Card Transactions, Payment over Internet-Issues and Concerns, Secure Electronic Transaction, Online Rail Ticket Booking. **Electronic Mail Security:** Pretty Good Privacy, S/MIME.

Text Books	
T.1	Cryptography and network security - principles and practices, William Stallings, Pearson Education, 2002.
T.2	Network Security and Cryptography, Bernard Menezes, Cengage Learning.
Reference Books	
R.1	Information System Security, Nina Godbole, Wiley India, 2008.
R.2	Network security, private communication in a public world, Charlie Kaufman, Radia Perlman and Mike Speciner, Prentice Hall, 2002.

Useful Links	
1	https://nptel.ac.in/courses/108/104/108104139/
2	http://nptel.ac.in/courses/117107095
3	http://nptel.ac.in/courses/117103064

Course Coodinator-BCS4702 H.O.D

HOD Deptt. (CSE) Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Fourth Year B.Tech. (Seven Semester)				
BCS4706: Full Stack Developer				
Teaching Scheme			**Examination Scheme**	
Lectures	4Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits: 4			**Duration of Exam :**3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	Understand the concept of .NET full Stack Development using C#, ASP, MVC Controller.
2.	Apply the concept in .NET full stack development.
3.	Design various applications using .NET framework.

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4706.1	Understand the .NET framework its architecture, and its role in modern software development.
BCS4706.2	Explore database objects such as tables, views, stored procedures, functions, and triggers.
BCS4706.3	Implement interactivity with JavaScript programming fundamentals, including variables, functions and event.
BCS4706.4	Apply best practices best practices in MVC development, including code organization, separation of concerns, dependency injection, and testability, to build robust and maintainable MVC applications.
BCS4706.5	Apply data validation techniques in ASP.NET Core API controllers to validate request data.

Course Contents	
Unit I	**Introduction .NET:** Introduction NET, application and structure of application, Object Oriented Programming Concept in C#.
Unit II	**Introduction to Database:** LINO, SQL Sever, DataBase Object introduction, Sql, Triggers
Unit III	**Introduction to Frontend:** ADO.NET, HTML, CSS, UI and Front End, Java Script
Unit IV	**MVC:** What is MVC, components, Interaction among components, Program.es and StartUp.cs file, Configure Server, Controllers, Creating first app in MVC
Unit V	**Implementation Data Validation:** Implementing data validation, annonations and Validation Summary and Exception handling mechanism in MVC, API routing, parameter binding

Text Books	
T.1	"C# 9 and .NET 5 – Modern Cross-Platform Development: Build intelligent apps, websites, and services with ASP.NET Core 5, Blazor, and Entity Framework Core using Visual Studio Code" by Mark J. Price - This book covers the introduction to .NET, object-oriented programming in C#, and ASP.NET Core MVC development.
T.2	"Microsoft SQL Server 2019: A Beginner's Guide, Seventh Edition" by Dusan

	Petkovic - This book provides a solid introduction to SQL Server, database objects, SQL querying, and triggers
T.3	"HTML and CSS: Design and Build Websites" by Jon Duckett - This book offers a beginner-friendly introduction to HTML and CSS for frontend web development.
Reference Books	
R.1	Book Title: "C# 9 and .NET 5 – Modern Cross-Platform Development: Build intelligent apps, websites, and services with ASP.NET Core 5, Blazor, and Entity Framework Core using Visual Studio Code" Author: Mark J. Price
R.2	Book Title: "Microsoft SQL Server 2019: A Beginner's Guide, Seventh Edition"Author: Dusan Petkovic

	Useful Links
1	https://www.youtube.com/watch?v=HOhW3BcD4y8
2	https://www.youtube.com/watch?v=bMd1sw-2RGg

Course Coodinator- BCS4706 H.O.D

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Fourth Year B.Tech. (Seventh Semester)				
BCS4707: Software Project Management				
Teaching Scheme			**Examination Scheme**	
Lectures	3 Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits : 3			**Duration of Exam :** 3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	To understand the Software Project Planning and Evaluation techniques and plan and manage projects at each stage of the software development life cycle (SDLC).
2.	To learn about the activity planning and risk management principles and manage software projects and control software deliverables.
3.	To develop skills to manage the various phases involved in project management and people management and to deliver successful software projects that support organizations strategic goals.

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4707.1	**Understand** Project Management principles while developing software.
BCS4707.2	**Classify** extensive knowledge about the basic project management concepts, framework and the process models.
BCS4707.3	**Adapt** adequate knowledge about software process models and software effort estimation technique
BCS4707.4	**Apply** project reporting structure, project progress and tracking mechanisms using project management principles.
BCS4707.5	**Evaluate** risks involved in various project activities.

Course Contents	
Unit I	**Introduction and Software Project Planning:** Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.
Unit II	**Project Organization and Scheduling Project Elements:** Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts. (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming

Unit III	**Project Monitoring and Control:** Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.
Unit IV	**Software Quality Assurance and Testing Objectives:** Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.
Unit V	**Project Management and Project Management Tools Software Configuration Management:** Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Text Books	
T.1	M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
T.2	Royce, Software Project Management, Pearson Education
T.3	Kieron Conway, Software Project Management, Dreamtech Press
Reference Books	
R.1	S. A. Kelkar, Software Project Management, PHI Publication.
R.2	Harold R. Kerzner, Project Management "A Systems Approach to Planning, Scheduling, and Controlling" Wiley.
R.3	Mohapatra, Software Project Management, Cengage Learning.

Useful Links	
1	https://nptel.ac.in/courses/106/105/106105218/
2	https://freevideolectures.com/course/4071/nptel-software-project-management

Course Coodinator – BCS4707 H.O.D

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Fourth Year B.Tech (Seven Semester)				
BCS4708: Fundamental of Augmented and Virtual Reality				
Teaching Scheme			**Examination Scheme**	
Lectures	3 Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits : 3			**Duration of Exam :** 3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	Ability to understand virtual reality and virtual environment and able to Classify 3D user interface input hardware
2.	Able to analyze software technologies processes and Describe features, technology and challenges of augmented reality
3.	Examine various 3D interaction techniques, design and developing 3D user interface

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4708.1	**Understand** virtual reality and virtual environment
BCS4708.2	**Classify** 3D user interface input hardware
BCS4708.3	**Analyze** software technologies processes
BCS4708.4	**Examine** various 3D interaction techniques, design and developing 3D user interface
BCS4708.5	**Discuss** features, technology and challenges of augmented reality

Course Contents	
Unit I	**Virtual Reality And Virtual Environments**: The historical development of VR: Scientific landmarks Computer Graphics, Real-time computer graphics, Flight simulation, Virtual environments, Requirements for VR, benefits of Virtual reality. **Hardware Technologies For 3d User Interfaces:** Visual Displays Auditory Displays, Haptic Displays, Choosing Output Devices for 3D User Interfaces.
Unit II	**3D User Interface Input Hardware**: Input device characteristics, Desktop input devices, Tracking Devices, 3D Mice, Special Purpose Input Devices, Direct Human Input, Home - Brewed Input Devices, Choosing Input Devices for 3D Interfaces.
Unit III	**Software Technologies**: Database - World Space, World Coordinate, World Environment, Objects - Geometry, Position / Orientation, Hierarchy, Bounding Volume, Scripts and other attributes, VR Environment - VR Database, Tessellated Data, LODs, Cullers and Occluders, Lights and Cameras, Scripts, Interaction - Simple, Feedback, Graphical User Interface, Control Panel, 2D Controls, Hardware Controls, Room / Stage / Area Descriptions, World Authoring and Playback, VR toolkits, Available software in the market
Unit IV	**3D Interaction Techniques**: 3D Manipulation tasks, Manipulation Techniques and Input Devices, Interaction Techniques for 3D Manipulation, Deign Guidelines - 3D Travel Tasks, Travel Techniques, Design Guidelines - Theoretical Foundations of

	Way finding, User Centered Way finding Support, Environment Centered Way finding Support, Evaluating Way finding Aids, Design Guidelines - System Control, Classification, Graphical Menus, Voice Commands, Gestrual Commands, Tools, Mutimodal System Control Techniques, Design Guidelines, Case Study: Mixing System Control Methods, Symbolic Input Tasks, symbolic Input Techniques, Design Guidelines, Beyond Text and Number entry .
Unit V	**Augmented and Mixed Reality**, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

Text Books	
T.1	Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann, 2009.
T.2	Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
T.3	Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice", Addison Wesley, USA, 2005.
Reference Books	
R.1	Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Meging Real and Virtual Worlds", 2005
R.2	William R Sherman and Alan B Craig, "Understanding Virtual Reality: Interface, Application and Design (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002

Useful Links	
1	https://nptel.ac.in/courses/106/106/106106138/

Course Coodinator – BCS4708 H.O.D

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Fourth Year B.Tech (Seven Semester)				
BCS4709: Deep Learning				
Teaching Scheme			**Examination Scheme**	
Lectures	3 Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits: 3			**Duration of Exam:** 3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	Understand complexity of Deep Learning algorithms and their limitations
2.	Be capable of performing distributed computations;
3.	Be capable of performing experiments in Deep Learning using real-world data

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4709.1	**Analyze** the Machine Learning and **Categorize** Neural network
BCS4709.2	**Evaluate** Deep learning types and application in real time
BCS4709.3	**Illustrate** Deep learning architecture
BCS4709.4	**Differentiate** the Algorithm used in Deep learning
BCS4709.5	**Estimate** CNN and Tools for Deep learning: Keras,Numpy

Course Contents	
Unit I	**Deep Neural Network:** Types, Perceptron Training Rule, Forward Neural network: Forward Neural Networks, Back propagation neural network, Gradient Descent & Back Propagation Algorithm: Gradient Descent, Stochastic Gradient , Vanishing Gradient problem
Unit II	**Introduction to deep learning** :Defination, Importance ,Types of Deep Learning Networks Feed forward neural network, Radial basis function neural networks, Multi-layer perceptron, Convolution neural network (CNN) ,Recurrent neural network. Application of Deep learning in real time.
Unit III	**Deep learning architectures:** LSTM, GRU, Encoder/Decoder Architectures, Deep learning types of Auto encoders and Denoising Auto encoders, Adversarial Generative Networks, Autoencoder and DBM
Unit IV	**Types of Algorithms used in Deep Learning:** Convolutional Neural Networks (CNNs),Long Short Term Memory Networks (LSTMs),Recurrent Neural Networks (RNNs),Generative Adversarial Networks (GANs),Restricted Boltzmans machine (RBM) ,Radial Basis Function Networks (RBFNs),Multilayer Perceptrons (MLPs), Self-Organizing Maps (SOMs),Deep Belief Networks (DBNs)
Unit V	**Convolutional Neural Networks**: CNN Architectures, Convolution, Pooling Layers, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, LeNet, AlexNet

	Deep learning tools- NumPy.,Keras, TensorFlow, Installation of Keras and TensorFlow for Deep learning.

Text Books	
T.1	Goodfellow, I., Bengio, Y., and Aaron Courville, A Deep Learning, MIT Press, 2016.
T.2	Introduction to Artificial Neural Systems BY Jacek M. Zurada
Reference Books	
R.1	Deep Learning: A Practitioner's Approach by Josh Patterson,Adam Gibson

Useful Links	
1	https://youtu.be/aPfkYu_qiF4?si=xapiw6eRIyj1cXiC
2	https://youtu.be/W3_yaf3HvHU?si=LOal6eF8kkT6IVgy

Course Coodinator-BCS4709 H.O.D

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics
Tulsiramji Gaikwad-Patil
College Of Engineering
and Technology, Nagpur

Fourth Year B.Tech (Seven Semester)				
BCS4710: Ad-Hoc and Sensor Networks				
Teaching Scheme			**Examination Scheme**	
Lectures	3 Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits: 3			**Duration of Exam :** 3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	To study about the basics of wireless sensors networks and underrated the architecture
2.	To understand the challenges in wired vs. wireless domain in computer networks.
3.	To study about various types of wireless networks, i.e cellular networks, Bluetooth, Ad hoc networks and wireless sensor networks.

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4710.1	**Understand** the basic concepts of WIRELESS networks and challenges of adhoc and sensor networks
BCS4710.2	**Categorize** the different types of MAC protocols.
BCS4710.3	**Identify** and analyze deficiencies in existing wireless protocols for MAC layer and Network layer, and then go onto formulate new and better protocols.
BCS4710.4	**Understand** the concepts of network architectures and applications of ad hoc and wireless sensor networks
BCS4710.5	**Design** routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues

Course Contents	
Unit I	**Introduction to Sensor networks**: application Examples of available sensor nodes, Challenges for WSN's, Mobile ad hoc networks and wireless sensor networks, single node architecture. Sensor node hardware overview, Sensors and actuators, Energy consumption of sensor nodes.
Unit II	**Network Architecture**: Sensor network scenarios, Design principles for WSNs, Services interfaces of WSNs, Gateway concepts, Mac protocols: Fundamentals, Low duty cycle and Wakeup concepts, contention and schedule-based protocols.
Unit III	**Mac Protocols For Ad Hoc Wireless Networks**: - Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11.
Unit IV	**Wireless Sensor Networks (Wsns) And Mac Protocols**: - Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

Unit V	**Routing protocols and content-based networking**: Broadcast and multicast protocols Geographic Routing, Mobile nodes, Data centric Routing, Distribution versus gathering of data-In-network processing, Data Aggregation, data centric storage. **Issues in WSN routing** – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

Text Books	
T.1	C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.
T.2	Protocols and Architectures for Wireless Sensor Networks, Holger Karl, and Andreas Willig, Wiley, 2005.
T.3	Wireless Sensor Networks, Cauligi S. Raghavendra, Krishna Sivalingam and Taieb M. Znati, Springer, 2005.
Reference Books	
R.1	Wireless and Personal Communications Systems, Vijay K. Grag and Joseph E. Wilkes, Prentice Hall, 1995.
R.2	Routing in the Internet, Christian Huitema, Prentice Hall, 1995.

Useful Links	
1	https://www.digimat.in/nptel/courses/video/106105160/L01.html
2	http://www.infocobuild.com/education/audio-video-courses/computer-science/WirelessSensorNetworks-IIT-Kharagpur/lecture-22.html

Course Coodinator-BCS4710 H.O.D

HOD
Deptt. (CSE)
Tulsiramji Gaikwad-Patil College of Engineering & Technology
Mohagaon, Wardha Road, Nagpur

Dean Academics
Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Fourth Year B.Tech (Seven Semester)				
BCS4711: Embedded System				
Teaching Scheme			**Examination Scheme**	
Lectures	3 Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits: 3			**Duration of Exam :** 3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	To give sufficient background for understanding embedded systems design.
2.	To understand connections of various peripherals with microcontroller-based systems.
3.	To Analyze embedded system based on RTOS and communication protocols.

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4711.1	**Understand** the concepts of Embedded System design.
BCS4711.2	**Analyze** real time operating systems used to design embedded systems.
BCS4711.3	**Make Use of** a microcontroller for embedded system design.
BCS4711.4	**Analyze** communication technique and protocol used in embedded.
BCS4711.5	**Design** and interface various devices to the microcontroller.

Course Contents	
Unit I	**Introduction to an embedded systems design:** Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Use of software tools for development of an ES, embedding software on target machine.
Unit II	**Introduction to real time operating systems:** Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.
Unit III	**Overview of Microcontroller:** Microcontroller and Embedded Processors, Overview of 8051 Microcontroller Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, 8051 Register Banks and Addressing Modes, accessing memory, Arithmetic instructions and programs, Logical instructions, Single-bit instruction programming.
Unit IV	**Communication with 8051:** Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, 8051 connections to RS-232, 8051 serial communication programming, 8051 interrupts, Programming of timer interrupts, Interrupt priority in the 8051.
Unit V	**Interfacing with 8051:** Interfacing an LCD to the 8051, 8051 interfacing to ADC, Sensors, Interfacing a Stepper Motor, 8051 interfacing to the keyboard.

Text Books	
T.1	Raj Kamal, "Embedded Systems", TMH, 2004.
T.2	M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2004..
Reference Books	
R.1	Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press Society, 2015
R.2	K.J. Ayala, "The 8051 Microcontroller", Penram International, 1991.

Useful Links	
1	https://nptel.ac.in/courses/106/105/106105193/
2	https://onlinecourses.nptel.ac.in/noc20_ee98/preview

Course Coodinator-BCS4711 H.O.D

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Fourth Year B.Tech (Seven Semester)				
BCS4712: DevOps				
Teaching Scheme			**Examination Scheme**	
Lectures	4Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits: 4			**Duration of Exam :**3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	Understand the benefits of DevOps over other software development processes, gain insights into the DevOps environment, get an overview of different DevOps Tools and Get a picture of the working of the DevOps Delivery Pipeline.
2.	Understand Version Control, perform management of files for small as well as large projects, perform various Git commands such as git add, git fetch, git commit, git init, etc. Work with remote repositories
3.	Learn and install Selenium, Create Test Cases in Selenium WebDriver, Utilize X-Path and TestNG to locate elements, execute code on several browsers using Selenium suite of tools, and Integrate Selenium with Jenkins.

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4712.1	**Understand** the concepts software development processes
BCS4712.2	**Recognize** the factors that gain insights into the DevOps environment.
BCS4712.3	**Make Use of** management of files for small as well as large projects
BCS4712.4	**Analyze** Continuous DeploymentSelenium
BCS4712.5	**Analyze** the Monitoring tools using DevOps.

Course Contents	
Unit I	**Introduction to DevOps Introduction**: Architecture, Lifecycle, Workflow Principles, DevOps Tools, Concept of Automation, Engineering, Pipeline Methodology, DevOps Vs Agile.
Unit II	**Continuous Development Code and Build Tools:** Version Control Using GIT: Introduction, Features, benefits, GitHub, staging and commits, undoing changes, inspecting changes, branching and merging, collaborating: fetch, pull and push. Building Tools Mavens: Introduction to maven, Architecture, integration, plugin management, master-slave architecture, delivery pipeline vs declarative pipeline
Unit III	**Testing/Continuous Integration/Continuous DeploymentSelenium:** Basic terminology, features, limitations, selenium vs QTP, selenium tool suite, selenium with maven/JenkinsJenkins: Introduction, work flow, continuous integration, advantage and disadvantages, architecture: master-slave, setup with github vs maven, configuration, management, user management, pipeline, notification, reporting, code analysis, distributed builds, automated deployment, metrics and trends, server maintenance, continuous deployment, Jenkins managing plugin,

	backup plugin.
Unit IV	**Operate using Ansible / Puppet / Docker / Kubernetes/Ansible:** Introduction, workflow, architecture, various commands, playbook, roles, modules, shell, YAML, file management, ansible vs chef vs puppet.Puppet: architecture, components, applications, installation, coding style, modules, file server, classes, function, type provider, template custom function. **Orchestration Tools Docker:** Introduction, Architecture, Containerization, lifecycle, CLI, port binding, detached and foreground mode, file system, registry, stirage, volume, compose and swarm. **Kubernetes**: Core Concepts, Understand Pods, replica set and replication Controller, deployments, daemonsets, rolling updates and rollbacks, scaling application, services, persistent vs primitives, secret and configMaps, headless services, statefulsets, ingress
Unit V	**Monitoring Tools: Nagios**: Introduction, features of Nagios, architecture: schedular, GUI, plugin, installation of Nagios core, advantage and disadvantage. **Prometheus and Grafna:** Introduction to Prometheus and Grafana, Prometheus and Grafana Setup, Monitoring using Prometheus, Dashboard Visualization using Grafana, creating a Dashboard to monitor the Pipeline

Text Books	
T.1	A Practical Guide to Continuous Delivery, Eberhard Wolf, Addison-Wesley 2017
T.2	Devops with windows server 2016, Ritesh Modi ,PACKT Publishing enterprise
Reference Books	
R.1	The Devops 2.0 Tool Kit Viktor Farcic PACKT BIRMINGHAM - MUMBAI Publishing enterprise
R.2	Implementing Devops with Ansible 2 Joathan McAllister PACKT BIRMINGHAM - MUMBAI Publishing enterprise

Useful Links	
1	https://www.youtube.com/watch?v=sz5gfkwPITE&list=PLhNrFKat_aeIogDQc0xnEiZ2TLDKzZCEM
2	https://www.youtube.com/watch?v=hQcFE0RD0cQ&list=PL9ooVrP1hQOE5ZDJJsnEXZ2upwK7aTYiX

Course Coodinator- BCS4712 H.O.D

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur

Fourth Year B.Tech (Seven Semester)				
BCS4713: Big Data Analytics				
Teaching Scheme			**Examination Scheme**	
Lectures	4Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits: 4			**Duration of Exam :**3 Hours	

Course Objectives	
The Objectives of this course is:	
1.	Optimize business decisions and create competitive advantage with Big Data analytics
2.	Introducing Java concepts required for developing map reduce programs
3.	Derive business benefit from unstructured data

Course Outcomes	
At the end of the unit, students will be able to :	
BCS4713.1	**Preparing** for data summarization, query, and analysis.
BCS4713.2	**Applying** data modeling techniques to large data sets
BCS4713.3	**Creating** applications for Big Data analytics
BCS4713.4	**Building** a complete business data analytic solution
BCS4713.5	**Evaluating** Local and Distributed Modes of Running Pig Scripts

Course Contents	
Unit I	**Data structures in Java:** Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization
Unit II	**Working with Big Data:** Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.
Unit III	**Writing MapReduce Programs:** A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner
Unit IV	**Hadoop I/O:** The Writable Interface, WritableComparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators
Unit V	**Pig:** Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin,

	Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Text Books	
T.1	Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
T.2	Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
T.3s	Hadoop in Action by Chuck Lam, MANNING Publ.
Reference Books	
R.1	Hadoop in Practice by Alex Holmes, MANNING Publ.
R.2	Hadoop MapReduce Cookbook, SrinathPerera, ThilinaGunarathne

Useful Links	
1	Hadoop: http://hadoop.apache.org/
2	Hive: https://cwiki.apache.org/confluence/display/Hive/Home

Course Coodinator- BCS4712 H.O.D

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur

Dean Academics
Tulsiramji Gaikwad-Patil
College Of Engineering
and Technology, Nagpur