BTech 7th semester Syllabus

MOBILE COMPUTING	
Course Code: BIT 401 Contact Hours: L-3 T-0 P-2 Course Category: DCC	Credits: 4 Semester: 7

Introduction: Mobile Computing refers a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device. It is free from having a connection with a fixed physical link. It facilitates the users to move from one physical location to another during communication.

Course Objective:

- To introduce the basic concepts and principles in mobile computing. This includes major techniques involved, and networks as well as systems issues for the design and implementation of mobile computing systems and applications.
- To understand the basic concepts of mobile communication and computing.
- To understand telecommunication systems and gain knowledge about different mobile platforms and application development.

Pre-requisite: Computer Networks

Course Outcome: Upon successful completion of this course, students will be able to:

CO1: Learn the basic concepts and applications of Mobile Computing and Cellular architecture;
CO2: Evaluate the effectiveness of the existing telecommunication systems such as GSM, GPRS, and UMTS;
CO3: Analyze the protocol suite for the wireless architecture (Mobile IP, Mobile TCP, and Wireless application protocols);
CO4: Explain the Bluetooth technology, and develop mobile applications for different domains.

Pedagogy:
The teaching-learning of the course would be organized through lectures, tutorials, assignments, projects/ presentations and quizzes. Students would be encouraged to develop an understanding of the existing real-life issues and how they are solved. Emphasis would be given on assignments where students will be given numerical/ programming assignments based on topics studied in previous lectures. Course will have a blend of theory and practice for the benefit of students. Use of ICT, web-based sources as well as blackboard teaching will be adopted.

Unit 1
Introduction to Mobile Computing: History, Types, Benefits, Application, Evolution, Characteristics of Mobile computing, Security Concern regarding Mobile Computing, Different Propagation Modes, Wireless Architecture and its types. First-Generation Analog, Second-Generation TDMA, Second-Generation CDMA, Third-Generation Systems; **Cellular Concept:** Cellular Systems and Principals of Cellular Networks, Hexagonal geometry cell and concept of frequency reuse, Channel Assignment Strategies, Distance to frequency reuse ratio; Electromagnetic Spectrum, **Antennas and Propagation**-Antennas, Propagation Modes, Line-of-Sight sionTransmis, Fading in the Mobile Environment, Signal Characteristics; Channel Capacity, Multiplexing, Spread Spectrum: DSSS & FHSS, CDMA.
Unit 2
Telecommunication Systems: GSM: Architecture, Channel allocation ,call routing, PLMN interface, GSM addresses and identifiers, network aspects, frequency allocation, authentication and security, Handoffs Technique; **GPRS:** network architecture, network operation, data services, Applications, Billing and charging; **UTRAN, UMTS**; **Mobile Networking**: Medium Access Protocol, Internet Protocol and Transport layer, Medium Access Control: Motivation for specialized MAC, Introduction to multiple Access techniques (MACA)
Unit 3
Mobile IP: Features of Mobile IP and its need, IP packet delivery, Key Mechanism in Mobile IP, Agent Discovery, Registration, Tunnelling and encapsulation, Reverse Tunnelling, Routing (DSDV,DSR), Route optimization, IP Handoff; **Mobile TCP:** Traditional TCP, Classical TCP Improvements like Indirect TCP, Snooping TCP & Mobile TCP, Fast Retransmit/ Fast Recovery, Transmission/Timeout Freezing, Selective Retransmission; **Wireless Application Protocol:** Introduction, Application, Architecture, Protocol Stack and Challenges.
Unit 4
Bluetooth: Introduction, User Scenario, Architecture, protocol stack; IP Mobility, Macro Mobility and Micro Mobility, Introduction to 4G and 5G; LTE, HIPERLAN, Mobile Device Operating Systems, Special Constrains & Requirements, Commercial Mobile Operating Systems, Software Development Kit: iOS, Android, BlackBerry, Windows Phone, M-Commerce, Structure, Mobile Payment System.
References
1. John H. Schiller, Mobile Communications, Pearson Education, 2nd Edition, 2003.
2. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, Mobile Computing: Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.
3. Andreas F. Molisch, Wireless Communications, 2nd Edition, Wiley –India, 2006.
4. Raj Kamal, Mobile Computing, 3rd Edition, Oxford University Press, 2018.
5. Frank Adelstein, S.K.S. Gupta, Golden G. Richard III and Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional

MACHINE LEARNING	
Course Code: BCS 401 Contact Hours: L-3 T-0 P-2 Course Category: DCC	Credits:4 Semester:7

Introduction:
Machine learning (ML) is the science of getting computers to act without being explicitly programmed. Many researchers also think it is the best way to make progress towards human-level AI. This course provides a broad introduction to machine learning, data mining, and statistical pattern recognition.

Course Objectives:

- To provide an introduction to the basic principles, techniques, and applications of ML.
- To explain the strengths and weaknesses of different machine learning algorithms (relative to the characteristics of the application domain)
- To be able to adapt or combine some of the key elements of existing machine learning algorithms to design new algorithms as needed.

Pre-requisites: Knowledge of programming, basic probability theory and statistics

Course Outcomes: After completion of the course, student will be able to:

CO1: Understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
CO2: Understand the basic concepts of neural network model and design the same.
CO3: Understanding of the strengths and weaknesses of many popular machine learning algorithms.
CO4: Understanding the concepts of Unsupervised learning.

Pedagogy:
The teaching-learning of the course would be organized through lectures, tutorials, assignments, projects/ presentations and quizzes. Faculty members strive to make the classes interactive so that students can correlate the theories with practical examples for better understanding. Use of ICT, web-based resources as well as flipped class room teaching will be adopted.

UNIT-I	12 Hours
Introduction to Machine Learning, Well Posed Problems, Machine Learning Process, designing a Learning System, Types of Machine Learning, Applications of Machine Learning, Feature Selection and Visualization, Testing ML Algorithms (Overfitting, Training, Testing, And Validation Sets, Confusion Matrix, Accuracy Metrics, ROC Curve, Unbalanced Datasets, Precision), Gradient Descent Algorithm, Univariate and Multivariate Linear Regression, Logistic regression. Case studies on Linear and logistic regression	
UNIT-II	**10 Hours**
The Brain and The Neuron, Neural Networks, The Perceptron, Linear Separability, The Multi-Layer Perceptron, Forward and Back-error propagation, The Curse of Dimensionality, Dimensionality Reduction, Principal Component Analysis. Case studies on Neural Networks	
UNIT-III	**10 Hours**
Learning With Decision Tree, ID3, CART, Ensemble Learning, Boosting, AdaBoost , Bagging, Random Forest. k-Nearest Neighbor Classification, Support Vector Machines, Naive Bayes classifiers, Case studies on various classifiers	
UNIT-IV	**10 Hours**
Unsupervised Learning, Clustering, K-Means Clustering, Hierarchical Clustering, Partitioning methods, Distribution based clustering, Density based clustering, fuzzy clustering, Evaluation Parameters for Unsupervised Learning. Case studies on various clustering techniques	
Text Books	
1	Stephen Marsland, Machine Learning: An Algorithmic Perspective, Chapman and Hall/CRC; 2nd edition (8 October 2014)
2	Bishop, C.M., ,Pattern recognition and machine learning. Springer; 1st ed. 2006. Corr. 2nd printing 2011 edition (15 February 2010)
3	Tom Mitchell, Machine Learning, McGraw Hill Education; First edition (1 July 2017)
Reference Books	
1	T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, Springer; 2nd ed. 2009, Corr. 9th printing 2017 edition (19 April 2017)
2	Han, Jiawei, Jian Pei, and Micheline Kamber. Data mining: concepts and techniques. Morgan Kaufmann; 3rd edition (2011)

Industrial Training/ Internship	
Course Code: BIT-353 **Contact Hours**: **Course Category**: DCC	Credits: 1 Semester: 5

Course Objectives: Students will carry on the industrial training for six weeks making them capable of handling the implementation of their theoretical knowledge in the practical field. To facilitate the development of a holistic perspective among students towards life, industry experts teach advanced technologies. Through Industrial training, students get familiarize with the environment of an organization and a company. Students get a certificate which validates their skills and helps them in getting a job quickly.

Course Outcome: After completion of the elective course, the students will be able to:
CO1 Apply theoretical concepts to practical implementation.
CO2 Develop solutions for real world problems.

General Elective Course	
Course Code: GEC-301 **Contact Hours**: **Course Category**: GEC	Credits: 2 Semester: 5

Introduction:

A Generic Elective (GE) course is an inter-disciplinary course provided to the students chosen generally from an unrelated discipline/subject and allowing them a chance at comprehensive education. Generic Electives (GE) are introduced as part of the CBCS. The students can choose their preference from a pool of papers from various disciplines/subjects. Elective courses do much more than filling in the gaps to fulfill the high school graduation requirements. It gives a chance to explore new options, allowing students to study more about the subject they are passionate about, and enables them to 'test drive' new activities. They provide students with the necessary skills to improve creativity that they might not find in the classroom. The main purpose of the Elective course is to seek exposure to a new discipline/subject and to provide the students with an alternative option for desired fields.

Course objective:

- Students will have exposure to a new discipline/subject.
- Prepare students to look for inter-disciplinary research.
- GE can fulfill the limitation to pursue master's study in desired field.
- Help discover new things that never existed and might change the course of student's life.

Pre-requisite: Basic knowledge of the selected domain of elective course

Course Outcome: After completion of the elective course, the students will be able to:

CO1 Investigate future careers.

CO2 Allow diligent students to improve their knowledge and area of weakness.

CO3 Help students build a strong resume that shows students willingness and curiosities to the officials and employers.

CO4 Electives take students into the real world that doesn't require academic papers or research. **CO5** They not only learn to work independently, but they attain self-motivation, discipline, and confidence to achieve their goals.

Pedagogy: The teaching-learning of the course would be organized through lectures, tutorials, assignments, projects/ presentations and quizzes. Faculty members strive to make the classes interactive so that students can correlate the theories with practical examples for better understanding. Use of ICT, web-based resources as well as flipped class room teaching will be adopted.

BTech Eighth Semester Syllabus

EMBEDDED SYSTEM DESIGN	
Course Code: BCS 402 Contact Hours: L-3 T-0 P-2 Course Category: DCC	Credits: 4 Semester: 8

Introduction

This course aims at introducing the concepts and architecture of Embedded systems and to make the students capable of designing embedded systems. The course examines the contemporary issues and problems in the design and development, of contemporary real-time embedded systems

Course Objectives:

- To provide an overview of Design Principles of Embedded System.
- To provide clear understanding about the role of firmware, operating systems in correlation with hardware systems.
- To understand the procedure of Processor selection for Embedded System.
- To visualize the role of Real time Operating System in Embedded System.

Pre-requisites: Microprocessor, Operating Systems

Course Outcomes: After completion of the course the students will be able to:

CO1: Understand the Design Process of Embedded Systems, Differentiate the role of their functional blocks and illustrate their selection process.

CO2: Understand the programming model of ARM processor and apply the programming concepts to solve problems.

CO3: Understand the architecture of Real Time Operating Systems (RTOS) and evaluate its role in an Embedded System.

CO4: Analyse the Intel architecture for Embedded system and Design /Develop various real-world applications using the concept of interfacing.

Pedagogy:

The teaching-learning of the course would be organized through lectures, tutorials, assignments, projects/ presentations and quizzes. Faculty members strive to make the classes interactive so that students can correlate the theories with practical examples for better understanding. Use of ICT, web-based resources as well as flipped class room teaching will be adopted.

UNIT-I	10 Hours
Introduction to Embedded System Design: Definition, Classification of Embedded system and General-purpose computers, Embedded system design cycle, H/W-S/W Partitioning, Design and Integration, Selection Process, H/W-S/W Co-design, Memory organization, Interfacing, IDE Selection, Tool chain and Programming	
UNIT-II	**10 Hours**
Implementation Platforms and Its Programming: General Purpose and Domain Specific Processors, ASICs, Processor Selection for embedded systems and its issues, RISC and CISC architecture, ARMarchitecture (32-bit Cortex series), ARM programmer's model, ARM instruction set: Software interrupt (SWI) Interrupt Service Routines- Writing simple assembly language programs for ARM, 3-stage pipeline ARM organization Comparison between ARM and Atom processors.	
UNIT-III	**10 Hours**
RTOS based Embedded System Design: Basic concepts of Operating System, RTOS, RTOS kernel, Real Time Scheduling, Hard real time and Soft real time systems Interrupt Service Routines Interrupt routine in RTOS environment and handling of interrupt service calls, Watchdog timers-Flash memory, FreeRTOS.	
UNIT-IV	**10 Hours**
Embedded System Design Issues: Performance analysis and Optimization, speed, Power and Area Optimisation, System Reliability, Safety and Security Introduction to Reconfigurable platforms (SoC, FPGA), Host based debugging – Remote debugging, ROM emulators, In circuit emulators, Case studies of some applications of Embedded Systems.	
Text Books	
1	Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill,Second Edition Paperback – 1 2017
2	Embedded Systems Design: An Introduction to Processes, Tools, and Techniques by Arnold S. Berger, Elsevier India, 2010, Paperback.
3	ARM System Developer's Guide: Designing and Optimizing System Software, Andrew N. Sloss, Dominic Symes, Chris Wright, , Morgan Kaufman Publication, Elsevier First edition, 2004
Reference Books	
1	Embedded Systems- Architecture, Programming and Design ,Rajkamal, McGraw Hill Education 3rd Edition, 2017
2	Embedded System Design - Frank Vahid, Tony Givargis, JohnWiley, 2014
3	An Embedded Software Primer - David E. Simon, Pearson Education.,2002

EVOLUTIONARY COMPUTING	
Course Code: BCS - 403 Contact Hours: L-3 T-1 P-0 Course Category: DEC	Credits: 4 Semester: 7

Introduction:
This course introduces several computational methods that are based on principles of evolutionary biology.

Course Objectives:

- To study a thorough introduction to evolutionary computing (EC).
- To provide an understanding of the descriptions of popular evolutionary algorithm (EA) variants.
- To develop some familiarity with methodological issues and particular EC techniques.

Pre-requisites: Fundamentals of Algorithms.
Course Outcomes: After completion of the course the students will be able to gain:
CO1: Explain evolutionary computation techniques and methodologies set in the context of modern heuristic methods.
CO2: Apply various evolutionary computation methods and algorithms for particular classes of problems.
CO3: Develop evolutionary algorithms for real-world applications.
CO4: Use scientific research papers and present them in a seminar talk.

Pedagogy:
The teaching-learning of the course would be organized through lectures, tutorials, assignments, projects/ presentations and quizzes. Faculty members strive to make the classes interactive so that students can correlate the theories with practical examples for better understanding. Use of ICT, web-based resources as well as flipped class room teaching will be adopted.

UNIT-I	10 Hours
Evolutionary Computing: The Origins, The Main Evolutionary Computing Metaphor, Brief History. The Inspiration from Biology, Darwinian Evolution, Genetics. **Evolutionary Algorithm:** Components of Evolutionary Algorithms, An Evolutionary Cycle by Hand, Example Applications, The Operation of an Evolutionary Algorithm, Natural Versus Artificial Evolution, Evolutionary Computing, Global Optimisation, and Other Search Algorithms.	
UNIT-II	10 Hours
Representation, Mutation, and Recombination: Representation and the Roles of Variation Operators, Binary Representation, Integer Representation, Real-Valued or Floating-Point Representation, Permutation Representation, Tree Representation.	
UNIT-III	10 Hours
Popular Evolutionary Algorithm Variants: Genetic Algorithms, Evolution Strategies, Evolutionary Programming, Genetic Programming, Learning Classifier Systems, Differential Evolution, Particle Swarm Optimisation, Estimation of Distribution Algorithms.	
UNIT-IV	10 Hours
Swarm Optimization and Firefly Algorithm: Swarm intelligence - PSO algorithm - accelerated PSO - implementation - convergence analysis - binary PSO - The Firefly algorithm - algorithm analysis - implementation - variants- Ant colony optimization toward feature selection.	
Text Books	
1	A.E. Eiben J.E. Smith, “Introduction to Evolutionary Computing”, Second Edition, Natural Computing Series, Springer, 2015.
2	Evolutionary Optimization Algorithms: Biologically-Inspired and Population-Based Approaches to Computer Intelligence, John Wiley & Sons, 2013.
3	Helio J.C. Barbosa, "Ant Colony Optimization - Techniques and Applications", Intech 2013
Reference Books	
1	Kenneth De Jong, Lawrence Fogel, Hans-Paul Schwefel, “Handbook of Evolutionary Computation”, CRC Press, 1997.
2	Xin-She Yang ,Jaao Paulo papa, "Bio-Inspired Computing and Applications in Image Processing", Elsevier 2016.
3	Xin-She Yang, "Nature Inspired Optimization Algorithm, Elsevier First Edition 2014.
4	Yang ,Cui,XIao,Gandomi Karamanoglu ,"Swarm Intelligence and Bio-Inspired Computing", Elsevier First Edition 2013.

KNOWLEDGE ENGINEERING	
Course Code: BCS 405 Contact Hours: L-3 T-1 P-0 Course Category: DEC	Credits: 4 Semester: 7

Introduction:
This course aims at introducing the fundamental theory and concepts of computational intelligence methods, in particular neural networks, fuzzy systems, genetic algorithms and their applications in the area of machine intelligence.

Course Objectives:

- To provide an introduction to the basic principles, techniques, and applications of soft computing.
- To provide an understanding of the basic areas of Soft Computing including Artificial Neural Networks, Fuzzy Logic and Genetic Algorithms.
- To provide the mathematical background for carrying out the optimization associated with neural network learning.
- To develop some familiarity with current research problems and research methods in Soft Computing by working on a research or design project.

Pre-requisites:
Artificial Intelligence, Data structures and algorithms, programming languages.
Course Outcomes: After completion of the course the students will be able to.

CO1: Understanding and applying the basics of knowledge extraction, engineering, and linking, making data suitable to machine querying and automated reasoning, typically on decentralized platforms such as the Web.
CO2: Explain the fundamental concepts and various learning algorithms of supervised, unsupervised and associative memory networks in Artificial Neural Networks.
CO3: Apply evolutionary algorithm such as Genetic algorithms for solving optimization, path finding problems, etc.
CO4: Design and implement new variant of existing Heuristic and Metaheuristic algorithms through demonstration project on real world problems.

Pedagogy:
The teaching-learning of the course would be organized through lectures, tutorials, assignments, projects/ presentations and quizzes. Faculty members strive to make the classes interactive so that students can correlate the theories with practical examples for better understanding. Use of ICT, web-based resources as well as flipped class room teaching will be adopted.

UNIT I	10Hours
Introduction: Concept of Knowledge Engineering, Knowledge Economy, Knowledge Management vs Knowledge Engineering, Knowledge Engineering and Artificial Intelligence, Terminology related with Knowledge Engineering, Concept of Knowledge Reuse. Concept of Knowledgebase Intensive Systems and Development of elementary Knowledge Based System	
UNIT II	**10Hours**
Knowledge Acquisition and Knowledge Manipulation. Basic features of Knowledge Acquisition. Challenges in identification of Tacit Knowledge, Acquisition of Domain Knowledge, and Contextual Knowledge, Process of identification of explicit knowledge related to specific real world problems. Acquisition of static and dynamic knowledge. Concept of Knowledge Manipulation, Basic principles of Inferencing, Methods of inferencing, Forward chaining, Backward chaining, bidirectional chaining, Factors that decides the direction of inferencing, Drawing Conclusion using Inferencing.	
UNIT III	**10Hours**
Knowledge Management: Use and Reuse of Knowledge, Knowledge Management Overview, Knowledge Conversion, Knowledge Management Roles, Implications of Knowledge Management. **C**oncept of Expert System, Application Domain of Expert System	
UNIT IV	**10Hours**
Case study of Knowledge based systems, Study of systems that are dewsigned as expert systems, features, characteristics of expert systems, Case study of MYCIN, DENDRAL. Case study of Indian Govt. initiative led expert systems ArogyaSetu, UMANG .	
Text Books:	
1	James Martin, Problem Solving using Knowledge Engineering, PHI Publication, edition 4th 2017.
2	Ela Kumar, Knowledge Engineering, IK International Publication First Edition, 2017
3	Elias M.Awad, Hassan M.Ghaziri " Knowledge Management, PHI publication, Second Edition, 2011
Reference Books:	
1	Skyrme David " Knowledge Centric Problem Solving, Mc Graw Hill, publication 1st edition 2015.
2	Reich and Turing , " Artificial Intelligence", Mc Graw Hill, 3rd edition, 2016
3	M.Gahziri, Expert Systems Design, PHI publication, 1st edition , 2012,

KNOWLEDGE ENGINEERING	
Course Code: BCS 405 Contact Hours: L-3 T-1 P-0 Course Category: DEC	Credits: 4 Semester: 7

Introduction: The course will introduce fundamental principles of digital image processing. The course provides sufficient basic knowledge for the undergraduate to understand the design of digital image processing techniques such as image enhancement, restoration, segmentation, and morphological filtering.

Course Objective:

- Understand the design and analysis of various digital image processing techniques
- Understand the fundamental concepts and techniques used in digital image processing.

Pre-requisite:

Basics of engineering mathematics and signal and systems

Course Outcome: After completion of the course, student will be able to:

CO1: Understand basic image processing algorithms

CO2: Understand various applications of digital image processing

CO3: Design and analyze image enhancement, restoration, segmentation techniques for real time applications.

CO4: Apply the principles of digital image processing in developing some real world project.

Pedagogy: The teaching-learning of the course would be organized through lectures, assignments, projects/ presentations and quizzes. Faculty members strive to make the classes interactive so that students can correlate the theories with practical examples for better understanding. Use of ICT, web-based sources as well as flipped class room teaching will be adopted.

UNIT-I	12 Hours
Introduction: Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, Image Sensing and Acquisition, sampling and quantization, Basic Relationships between Pixels. **Image Enhancement**: Gray level transformation, Histogram Processing, Enhancement using arithmetic and logical operator, Spatial filtering, contrast intensification, smoothing and sharpening spatial filters, spatial filter enhancements.	
UNIT-II	**10 Hours**
Filtering in the Frequency domain: Introduction to Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2-D sampling, Frequency domain filtering, correspondence between filtering in spatial and frequency domain, smoothing and sharpening frequency domain filters, Homomorphic filtering. **Image Restoration:** Basic Framework, Interactive Restoration, Image deformation and geometric transformations, Image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Constrained Least Squares Filtering, Geometric Mean Filter, Geometric Transformations, Restoration by Singular value Decomposition.	
UNIT-III	**10 Hours**
Image Compression: Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Shannon's 1st Theorem, Introduction to different codings - Huffman Coding, Arithmetic Coding, LZW coding, Transform Coding, Sub-image size selection, blocking artifacts, DCT implementation using FFT, Run length coding, Symbol-based coding, Bit-plane encoding, Bit-allocation, Zonal Coding, Threshold Coding, JPEG, Lossless predictive coding, Lossy predictive coding, Motion Compensation, Introduction to Wavelet based Image Compression.	
UNIT-IV	**10 Hours**
Image Segmentation: Boundary detection-based techniques, Point, line detection, Edge detection, Edge linking, contour detection, local and regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, Moving averages, Multivariable thresholding, Region-based segmentation, Watershed algorithm, Use of motion in segmentation. **Morphological Image Processing:** Basics, SE, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary Detection, Hole filling, connected components, convex hull, thinning, thickening, skeletons, pruning, Erosion, Reconstruction by dilation & erosion.	

Text Books

1	Rafael C Gonzalez and Richard E Woods, "Digital Image Processing," Pearson Edu .3rd Ed., 2007.
2	Anil K Jain, "Fundamentals of Digital Image Processing," PHI, 1989.

Reference Books

1	B. Chanda and D. Dutta Majumder, "Digital Image Processing and Analysis," PHI, 2nd Ed. 2013.
2	Chris Solomon and Toby Breckon, "Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab," Wiley Blackwell, 1st Edition, 2010.

E-Commerce	
Course Code: BIT - 417 Contact Hours: L-3 T-1 P-0 Course Category: DEC	Credits: 4 Semester: 7

Introduction:

E-commerce is abbreviated for Electronic Commerce. Its function is the transference of financial and other commerce related information using Information Technology and Telecommunications. E-commerce helps to simplify the business processes and makes them faster and efficient. These business transactions occur either as business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer (C2C) or consumer-to-business (C2B). Benefits of e-commerce include its around-the-clock availability, the speed of access, the wide availability of goods and services for the consumer, easy accessibility and international reach.

Course Objectives:

- To understand the advantages and disadvantages of using e-commerce platforms.
- To learn various e-business strategies.
- To understand the various payment methods associated with e-commerce.
- To learn the concepts of security at various levels of e-commerce.

Prerequisite: Knowledge on the basics of Information Security, Networking

Course Outcome: Upon successful completion of this course, students will be able to:

CO1: Understand the basic concepts and principles of e-commerce.
CO2: Compare the advantages and disadvantages of using e-commerce platforms.
CO3: Understand various e-business strategies.
CO4: Identify security and privacy issues in e-commerce.

Pedagogy:

The teaching-learning of the course would be organized through lectures, tutorials, assignments, projects/ presentations and quizzes. Faculty members strive to make the classes interactive so that students can correlate the theories with practical examples for better understanding. Use of ICT, web-based resources as well as flipped classroom teaching will be adopted

UNIT I	10 hours
Electronic Commerce Introduction: - Definition of E- Commerce, Electronic commerce and Physical Commerce, Architectural framework, Impact of E-commerce on business, different type of e-commerce, some e-commerce scenario, Economic potential of electronic commerce, Advantages and Disadvantages, Incentives for engaging in electronic commerce, forces behind E-Commerce.	
UNIT II	**10 hours**
E-business strategy: Introduction, Characteristics of e-Business, Business models, E-Business vs E-commerce, e-business Requirements, impacts of e-business, Strategic positioning, Levels of e-business strategies, Strategic planning process, Success factors for implementation of e-business strategies, CRM, MRP. ERP: Introduction, need of ERP, Modules of ERP.	
UNIT III	**10 hours**
Electronic Payment Methods: Overview, SET Protocol for credit card payment, E-cash, E-check, Micropayment system, Credit card, Magnetic strip card, Smart cards, Electronic Data Interchange, E-Commerce Law. Security Architecture, Encryption techniques, Symmetric & Asymmetric encryption, Digital Signatures, Virtual Private Network, IPsec, Threats, Firewalls.	
UNIT IV	**10 hours**
M-Commerce: Introduction, Attributes, customer and provider views, Architecture, Infrastructure of m-commerce, Requirement of the m-commerce, characteristics, Mobile Information device, Mobile Computing Applications, Mobile wallet, Mobile payments, Mobile portals, Pros and Cons of m-commerce, Secure Transaction Processes: Wireless Application Protocol, Bluetooth, The role of emerging wireless LANs and 3G/4G wireless networks.	
Reference Books	
1. R. Kalakota, A. Whinston, "Frontiers of Electronic Commerce", 2nd Edition/Latest edition, Addison Wesley, 1996.	
2. B. Mennecke and T. Strader, "Mobile Commerce: Technology, Theory and Applications", Idea Group, 2003/Latest edition3.	
3. D. Chaffey, "E-Business and E-Commerce Management", 3rd Edition/Latest edition, Pearson Education, 2009.	
4. H. Chan, "E-Commerce Fundamentals and application", 1st Edition/Latest edition, Wiley publication, 2001.	
5. Bajaj and Nag, "E-Commerce the cutting edge of Business", 2nd Edition/Latest edition, TMH, 2005.	
6. P. Loshin, J. Vacca, "Electronic commerce", 1st Edition/Latest edition, Firewall Media, 2005.	