New courses introduced during the year 2021-22

Program: **Bachelor of Engineering**		
Course Title: **Blockchain and Distributed Ledgers**		Course Code:21ECSC307
L-T-P: 2-0-1	Credits: 3	Contact Hrs: **4 hrs/week**
ISA Marks: 50	ESA Marks: 50	Total Marks: 100
Teaching Hrs: 30	Exam Duration: 3 hrs	

	Unit –I	
1	**Introduction** Overview of blockchain, Digital Money to Distributed Ledgers, Design Primitives: Protocols, Security, Consensus, Permissions, Privacy, Types of blockchain, blockchain platforms, Blockchain Architecture and use cases, Introduction to Bitcoin, Bitcoin transactions and scripts	**6 hrs**
2	**Cryptography Basics** Introduction to cryptography, Public key crypto: Introduction, RSA, Digital certificate, PKI, Hash Functions: Introduction, SHA, Digital signature Schemes: RSA, Digital Signature Standard, Merkle trees.	**6 hrs**
	Unit –II	
3	**Consensus Mechanisms** Basic consensus mechanisms, Requirements for the consensus protocols, Proof of Work, Proof of State, Proof of Activity, Practical Byzantine Fault Tolerance (PBFT), Federated PBFT, Consensus protocols in Blockchain platforms, Scalability issues of consensus protocols.	**6 hrs**
4	**Blockchain Platforms** Ethereum transactions, accounts, smart contracts, smart contract development, Solidity basics, basic contracts, distributed storage and IPFS, Ethereum scaling, architecture and components of Hyperledger, Fabric membership and identity management, chaincode as a smart contract	**6 hrs**
	Unit –III	
5	**Blockchain Applications** Blockchain in Financial Software and Systems: Settlements, KYC, Insurance Government: Digital identity, land records, public distribution system, social welfare systems, Blockchain for cyber security: Cloud forensics, Identity management, Intrusion detection.	**6 hrs**

Reference Books:

1. Narayanan, Bonneau, Felten, Miller and Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, Princeton University Press, 2016.
2. Rogen Wattenhofer, “Blockchain Science : Distributed Ledger Technologies”, 1st Edition, Inverted Forest Publishing, 2019
3. Andreas A, Gavin Wood, "Mastering Etherium: Building smart contracts and DApp", 1st Edition, O'Reilly Media, 2018.
4. Matt Zand, Xun Wu, Mark Anthony Morris, “Hands-On Smart Contract Development with Hyperledger Fabric V2”, 1st Edition, O'Reilly Media, 2018.

Scheme for End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions
I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2,3	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	4,5,6	Solve Any **2** out of **3**
III	Q.No.-7	7	Solve Any **1** out of **2**
	Q.No.-8	8	

Program: Bachelor of Engineering		
Course Title: **Multimedia Networking**		Course Code: 21ECSE311
L-T-P:**3-0-0**	Credits: **3**	Contact Hrs: **3hrs/week**
ISA Marks: **50**	ESA Marks: **50**	Total Marks: **100**
Teaching Hrs: **40**	Exam Duration: **3 hrs**	

	Unit –I	
1	**Introduction to Multi media** Media and Data stream: Perception Media, Representation Media, Presentation Media, Storage Media; Key properties of Multimedia, Characterizing data streams and Continuous Media Data Streams.	4 hrs
2	**Graphics and Image Data representation** Graphics / Image data types, popular file formats, color science, color models in images, color models in video, Image analysis: Color, Texture identification, Edge detection using sobel operators, canny edge detection method, Image segmentation: pixel oriented, edge oriented, Region oriented, Image recognition. Image synthesis, Radon transforms.	6 hrs
3	**Fundamental concepts of Video and Audio** Types of video signal, digital video, Digitization of audio, MIDI standard, Quantization and transmission of audio	6 hrs
	Unit –II	
4	**Image compression techniques.** Lossless compression algorithms: Run-Length Coding, Variable-Length Coding (VLC), Shannon–Fano Algorithm, Huffman Coding, Adaptive Huffman Coding, Arithmetic Coding, Lossless JPEG, Lossy compression algorithms: Distortion Measures, The Rate-Distortion Theory, Quantization, Uniform Scalar Quantization, Non-uniform Scalar Quantization, Vector Quantization, Transform Coding, Discrete Cosine Transform (DCT), Introduction, Continuous Wavelet Transform, Discrete Wavelet Transform	6 hrs
5	**Video compression techniques.** Video compression based on motion compensation, H.261, H.263, MPEG -1. Basic audio compression techniques	6 hrs
6	**Computer based Animation** Basic concepts, specifications of animations, methods of controlling animation, display, transmission of animation, VRML	4 hrs
	Unit –III	
7	**Optical storage media** Basic technology, video disc, CDDA, CDROM, CDR/W, DVD	4 hrs
8	**Content Analysis** Simple and complex features: text recognition, similarity based search in image database, analysis of individual images, image sequences, applications.	4 hrs

Text Books:

1. Ze-Nian Li & Mark S.Drew, Jiangchuan Liu,"Fundamentals of Multimedia", Second Edition,Springer, 2014.
2. Ralf Steinmetz, Klara Narstedt, "Multimedia Fundamentals: Vol 1-Media Coding and Content Processing", 2nd Edition, Pearson Education / PHI, 2003.

Reference Books:

1. James E Shuman, "Multimedia in Action" 2nd Indian reprint 2008, Cengage learning.

Scheme for Semester End Examination (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions
I	Q.No.-1, Q.No.-2, Q.No.-3	1,2,3	Solve Any **2**
II	Q.No.-4, Q.No.-5, Q.No.-6	4,5,6	Solve Any **2**
III	Q.No.-7	7	Solve Any **1**
	Q.No.-8	8	

Program: **Bachelor of Engineering**		
Course Title: **Data Integration and Cloud Services (0-0-3)**		Coursecode: **21ECSE331**
L-T-P: 0-0-3	Credits: 3	Contact Hrs: **6hrs/week**
ISA Marks: 80	ESA Marks: 20	Total Marks: 100
Teaching Hrs: 60	Exam Duration: 3 hrs	

1	**Data Integration for Developers:** Introduction to PowerCenter, Folders, Sources, and Targets, Design Objects, File Lookups, Relational Lookups, Database Joins in PowerCenter,Workflow Logic, Merging, Routing, and Sorting Data, Command Tasks,Debugging,Parameterization,Updating Database Tables,Mapplets,Mapping Design Workshop, Addendum.	**20 hrs**
2	**PowerCenter Architecture and Transformations:** PowerCenter 10 Architecture, Parameter Files, User-Defined and Advanced Functions, Pivoting Data, Dynamic Lookups, Stored Procedure and SQL Transformations, Troubleshooting Methodology and Error Handling, Transaction Processing, Transaction Control Transformation, Recovery, Command Line Programs, Performance Tuning Methodology, Performance Tuning Mapping Design, Memory Optimization, Performance Tuning: Pipeline Partitioning.	**20 hrs**
3	**Cloud Application Integration Services:** Overview of Cloud Application Integration, Understand the Basics: Process Designer, Working with Assets,Adding Web Services to a Process, Fault Handling, Introduction to Guides Designer, API Management, CAI and CDI Integration, Troubleshooting, Tips & Tricks, Best Practices.	**10 hrs**
4	**Cloud Data Integration Services:** Informatica Cloud Overview, Runtime Environments and Connections, Synchronization Task, Cloud Mapping Designer, Cloud Mapping Designer – Transformations, Mapping Parameters, Expression Macro and Dynamic Linking,Replication Task, Masking Task, Mass Ingestion Task, Task flows, Hierarchical Connectivity, Intelligent Structure Model.	**10 hrs**

Text book:

1. Learning InformaticaPowerCenter 10.X,Second Edition, Rahul Malewar, Publisher: Packt, 2017.

Reference book:

1. Data Mining Concepts and Techniques, Third Edition, Jiawei Han, Micheline Kamber, Jian Pei, Publisher: Elsevier, 2012.

Program: **Bachelor of Engineering**		
Course Title: **DevOps**		Course Code: 21ECSE310
L-T-P: 0-0-3	Credits: 3	Contact Hrs: **6hrs/week**
ISA Marks: 80	ESA Marks: 20	Total Marks: 100
Teaching Hrs: 42	Exam Duration: 3 hrs	

	Unit –I	
1	**Introduction to DevOps and Continuous Delivery** Introducing DevOps, The Agile wheel of wheels, DevOps and ITIL, Infrastructure As A Code, Continuous Integration and Development.	**4hrs**
2	**Linux and Automation** User Management, Package Management, Networking, Shell Variable, Decision making, Shell test conditions, Shell loops, Re-directors, Exit status.	**4hrs**
3	**AWS Cloud** Introduction to cloud computing & AWS, Regions & AZ's, EC2, EBS, EFS, Auto scaling, Load balancing & Route 53, VPC, Object storage(S3), IAM & Monitoring(Cloudwatch), Database Services, AWS Lambda & CLI	**6hrs**
	Unit –II	
4	**Version Control with Git** SCM, Git branching and merging, Git Overview, Creating pull request, Code Review, Merging changes, Create a repo and push code on GibHub / Bitbucket	**4hrs**
5	**Continues Integration using Jenkins** Introduction, Setup & Launch Jenkins, Creating first job, Notifications, CICD pipeline, Build Pipeline plugin in Jenkins, Scheduling a job using cron tab, Scheduling a job using Poll SCM, Distributed Architecture in Jenkins, Adding linux slave to jenkins master	**7hrs**
6	**Configuration Management using Ansible** Introduction, Local infrastructure development, Ad-Hoc commands, Playbooks, Playbooks organization – Roles & Includes, Inventories, Ansible for AWS	**7hrs**
	Unit –III	
7	**Containers** Containers Concepts, Container Vs Virtual Machine, Docker installation, Managing Container with Docker Commands, Building your own docker images, Docker Compose, Docker registry - Docker Hub, Networking inside single docker container	**6hrs**
8	**Continues Monitoring using Prometheus and Grafana** What is continues monitoring, Goals, Types of Continues monitoring, Prometheus installation, Grafana installation, Integration of Prometheus and Grafana, Adding customised dashboard in Grafana, Introduction to node exporter, Integrating node exporter for monitoring, Monitoring docker and containers	**4 hrs**

Text Books:

1. Joakim Verona, "Practical DevOps." Packt Publishing Ltd, Feb. 2016, ISBN: 9781785882876
2. Jeff Geerling, "Ansible for DevOps: Server and configuration management for humans." Leanpub, 2015.
3. John Ferguson, "Jenkins: The Definitive Guide" Smart Publisher: O'Reilly Media, Release Date: June 2016.

Reference Books:

1. Jennifer Davis, Ryn Daniels, “Effective DevOps, Building a Culture of Collaboration, Affinity, and Tooling at Scale”, Publisher: O'Reilly Media, Release Date: June 2016.
2. Gene Kim, Patrick Debois, John Willis, Jez Humble, “The DevOps Handbook: How to Create World-Class Speed, Reliability, and Security in Technology Organizations”, IT Revolution Press, 2016.

Program: **Bachelor of Engineering**		
Course Title: **Fundamentals of Image and Video Processing**		Course Code: 21ECSE312
L-T-P: 2-0-1	Credits: 3	Contact Hrs: **3hrs/week**
ISA Marks: 50	ESA Marks: 50	Total Marks: 100
Teaching Hrs: 40	Exam Duration: 3 hrs	

	Unit –I	
1	**Introduction to Image and Video Processing** Introduction, 2-dimensional (2D) and 3-dimensional (3D) signals, analog/digital dichotomy, electromagnetic spectrum, and applications.	**4hrs**
2	**Signals and Systems** Fundamentals of 2D signals and systems. Complex exponential signals, linear space-invariant systems, 2D convolution, and filtering in the spatial domain.	**4 hrs**
3	**Fourier Transform and Sampling** 2D Fourier transform, sampling, discrete Fourier transform, and filtering in the frequency domain.	**4 hrs**
4	**Motion Estimation** Applications of motion estimation, phase correlation, block matching, spatio-temporal gradient methods, and fundamentals of color image processing.	**4 hrs**
	Unit –II	
5	**Image Enhancement** Point-wise intensity transformation, histogram processing, linear and non-linear noise smoothing, sharpening, homomorphic filtering, pseudo-coloring, and video enhancement.	**3 hrs**
6	**Image Recovery** Introduction to image and video recovery, image restoration, matrix-vector notation for images, inverse filtering, constrained least squares (CLS), set-theoretic restoration approaches, iterative restoration algorithms, and spatially adaptive algorithms. Wiener restoration filter, Wiener noise smoothing filter, maximum likelihood and maximum a posteriori estimation, and Bayesian restoration algorithms.	**5 hrs**
7	**Lossless and Lossy Compression** Elements of information theory, Huffman coding, run-length coding and fax, arithmetic coding, dictionary techniques, and predictive coding. Scalar and vector quantization, differential pulse-code modulation, fractal image compression, transform coding, JPEG, and sub band image compression.	**5 hrs**
8	**Video Compression** Motion-compensated hybrid video encoding and video compression standards including H.261, H.263, H.264, H.265, MPEG-1, MPEG-2, and MPEG-4.	**3 hrs**
	Unit –III	
9	**Image and Video Segmentation** Intensity discontinuity and intensity similarity, watersheds and K-means algorithms, and other advanced methods.	**4 hrs**
10	**Sparsity** Sparsity-promoting norms, matching pursuit algorithm, smooth reformulations, and an overview of the applications.	**4 hrs**

Text Books:

4. R. C. Gonzalez and R. E. Woods, “Digital Image Processing,” 4th edition, Pearson Education(Asia) Pte. Ltd/Prentice Hall of India, 2018.
5. M. Tekalp, “Digital Video Processing”, 2nd edition, Prentice Hall, USA, 2015.

Reference Books:

6. Anil K. Jain, “Fundamentals of Digital Image Processing," Pearson Education (Asia) Pte. Ltd./Prentice Hall of India, 2004.
7. Alan C Bovik “ Essential Guide to Video Processing”, AP Elsevier publication, 2009.

Scheme for End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions
I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2,3,4	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	5,6,7,8	Solve Any **2** out of **3**
III	Q.No.-7	9	Solve Any **1** out of **2**
	Q.No.-8	19	

Program: **Bachelor of Engineering**		
Course Title: **Signals & Systems**		Course Code: 21ECSE213
L-T-P: 3-0-1	Credits: 3	Contact Hrs: 5hrs/week
ISA Marks: 50	ESA Marks: 50	Total Marks: 100
Teaching Hrs: 50	Exam Duration: 3 hrs	

	Unit –I	
1	**Chapter No. 01: Signal Representation** Definition of a signals and systems, classification of signals,(analog and discrete signal, periodic and aperiodic, deterministic and random signals, even and odd signals, energy and power) , basic operation on signals(independent variable, dependent variable , time scaling, multiplication, time reversal), elementary signals (Impulse, step, ramp, sinusoidal, complex exponential), Systems Interconnections(series, parallel and cascade), properties of linear systems. (homogeneity ,superposition, linearity and time invariance, stability, memory, causality)	**10hrs**
2	**Chapter No. 02 : LTI System Representation** Impulse response representation and properties, Convolution, convolution sum and convolution integral. Differential and difference equation Representation, Block diagram representation	**10hrs**
	Unit –II	
3	**Chapter No. 03:Fourier representation for signals** Introduction, Discrete time Fourier series(derivation of series excluded) and their properties. Discrete Fourier transform (derivation of transform excluded) and properties	**10hrs**
4	**Chapter No. 04:Applications of Fourier transform** Introduction, frequency response of LTI systems, Fourier transform representation of periodic signals, Fourier transform representation of discrete time signals. Sampling of continuous time signals.	**10hrs**
	Unit –III	
5	**Chapter No. 05: Z-transform** Definition of z-transform, Properties of ROC, Properties of Z-transforms: Inverse z-transforms (Partial Fraction method, long division method), Unilateral Z-transform, Transform of LTI.	**10hrs**

Text Book (List of books as mentioned in the approved syllabus)

1. Simon Haykin and Barry Van Veen , Signals and Systems, 2nd edition Wiley,2007
2. Alan V Oppenheim ,Alan S Willsky and S. Hamid Nawab , Signals and Systems, Second, PHI public,1997

Reference Books:

1. H. P Hsu, R. Ranjan, Signals and Systems ,; 2nd edition, McGraw Hill ,2017
2. GaneshRaoandSatishTunga,,SignalsandSystems1st edition, Cengage India, 2017
3. M.J.Roberts, Fundamentals of Signals and Systems 2nd edition, McGraw Hill Education, 2017

Scheme for End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Numbers	Instructions
I	Q.No.-1, Q.No.-2, Q.No.-3	1, 2	Solve Any **2** out of **3**
II	Q.No.-4, Q.No.-5, Q.No.-6	3,4	Solve Any **2** out of **3**
III	Q.No.-7	5	Solve Any **1** out of **2**
	Q.No.-8	5	

Program: **Bachelor of Engineering**		
Course Title: **Neural Network and Deep Learning**		Coursecode: 21ECSE314
L-T-P: 2-0-1	Credits: 3	Contact Hrs: **50 hrs**
CIA Marks: 50	ESA Marks: 50	Total Marks: 100
Teaching Hrs: 30hrs	Exam Duration: 3 hrs	

	Unit-I	
1	**Introduction to Deep Neural Network – 1** Convolution and pooling, Activation functions, data processing, Batch Normalization, transfer learning, back propagation algorithms.	**6hrs**
2	**Deep Neural Network – 2** Update rules, hyper parameter tuning, vs learning rate scheduling, data augmentation Architectures: AlexNet, VGG, ResNet,MobileNet	**8 hrs**
	Unit-II	
3	**Deep Unsupervised Learning** Autoencoders (standard, denoising, contractive etc), Variational Autoencoders, Adversarial Generative Networks, Adversarial Examples and attacks, Conditional GAN, Super-Resolution GAN, CycleGAN	**8 hrs**
4	**Recurrent Neural Networks** Introduction, Long Short-Term Memory Network,Implementation of RNN & LSTM, Embeddings & Word2vec, Sentiment Prediction RNN	**6 hrs**
	Unit-III	
5	**Improving Deep Neural Networks** Regularization,Mini-batch Gradient Descent, Hyperparameter Tuning, Batch Normalization and Programming Frameworks	**4 hrs**

Text book:

1. Tom Mitchell., Machine Learning, Mc Graw Hill, McGraw-Hill Science ,edition 3
2. Deep Learning with Python, Second Edition,
3. Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2, 3rd Edition, Sebastian Raschka, Vahid Mirjalili.

Reference book:

1. Christopher Bishop., Pattern Recognition and Machine Learning, Springer, 2006
2. Hands-On Machine Learning with Scikit-Learn and TensorFlow, Concepts, Tools, and Techniques to Build Intelligent Systems ,By Aurélien Géron , Publisher: O'Reilly Media , July 2016
3. Advanced Machine Learning with Python Paperback, 28 Jul 2016 by John Hearty.

List of experiments:

Experiment No.	Brief description about the experiment	Number of slots
1.	Introduction to Neural networks training techniques.	2
2.	Designing the DNN model using transfer learning technique.	1
3.	Implementation of GAN: Experiment on Autoencoders and Variational Autoencoders	1

4.	Implementation of GAN: Experiments on Conditional GAN, Super-Resolution GAN, CycleGAN	2
5.	Implementation of RNN: Implementation of RNN & LSTM and Embeddings & Word2vec	1
6.	Experiments on Model Optimization Techniques: Hyper parameter tuning, Regularization and Optimization	1
7.	Course Project	4

Program: Bachelor of Engineering		
Course Title: **Exploratory Data Analysis**		Course Code: 21ECSC210
L-T-P: 2-0-2	Credits: 4	Contact Hrs: 6 hrs/week
ISA Marks: 80	ESA Marks: 20	Total Marks: 100
Teaching Hrs: **60**	Exam Duration: 3 hrs	Lab slots:15

	Unit –I	
1	**Introduction and scientific python** Ecosystem for data science, basic python, numerical and vectorized computation, data manipulation, data visualization.	**10 hrs**
2	**Exploratory Data Analysis** Types of data: categorical, numerical, probability distributions , Descriptive statistics, univariate and multivariate statistics, advanced data visualization, Case study	**10 hrs**
	Unit –II	
3	**Data Pre-Preprocessing** Data cleaning, data integration, dimensionality reduction: feature selection and feature extraction, data transformation	**10 hrs**
4	**Supervised Learning** Linear and logistic regression, naïve Bayes classifier, K-nearest neighbours	**10 hrs**
5	**Clustering** Partitioning-based, hierarchical clustering, density-based clustering	**10 hrs**
	Unit –III	
6	**Time-series analysis** Autocorrelation, time-series forecasting, auto regressive moving average models.	**10 hrs**

Reference Books:

1. Wes McKinney ,Python for Data Analysis, Published by O'Reilly Media, 2nd Edition ,October 2017.
2. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd edition, Morgan Kaufmann, 2012
3. Ian H. Witten, Eibe Frank, Mark A. Hall and Christopher J. Pal, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann; 4th edition, 2016.

Scheme for End Semester Assessment (ESA)

UNIT	**8 Questions to be set of 20 Marks Each**	**Chapter Numbers**	**Instructions**
I	Lab Exam on Course Project	1, 2	Demonstration of Course Project
II		3,4,5	
III		6	