

# Value Added **Courses**

**S Y L L A B U S**

**2022-23**



**KALINGA  
UNIVERSITY**

[www.kalingauniversity.ac.in](http://www.kalingauniversity.ac.in)



RAIPUR | INDIA





**SYLLABUS**  
**2022-23**

# VALUE ADDED COURSES

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# FACULTY OF ARTS & HUMANITIES

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# AGRO-MANAGEMENT OF MINIATURE GARDEN (VAC47)

**Total Duration: 40hrs**

## **Learning Outcome: After completion of the course student will be able to-**

Understand the process of sowing seeds / propagation techniques to grow a plant. List the various basic materials & resources required for the development of a plant. Distinguish among the different methods of growing plants. Analyse the process of Vegetative propagation. Appreciate the diversity of plants and selection of gardening. To be able to cultivate different vegetables as microgreens & select oxygen donors of indoor Learn how to prepare potting soil, seed germination Learn to grow vegetables and herbs Provide technical support to other enthusiasts promote sustainable production and consumption

### **UNIT-I**

Gardening tools, size of kitchen garden, purpose, kitchen garden site, preparation, containers

### **UNIT-II**

Soil types, Types of Soil, Soil pH, Water holding capacity, soil pH. Loam, farmyard manure, vermicompost, compost, cocopeat, vermiculite, perlite, clay balls, potting mixture

### **UNIT-III**

Seed, structure types, seed viability, seed germination, nursery, transplanting, study of cultivation of different vegetables tomato, green chillies, brinjal, lady's finger, onion, garlic, spinach, fenugreek.

### **Unit IV**

Kitchen garden for herbs: mint, thyme, basil, coriander, celery, holy basil, lemon grass, exotic vegetables: Importance of layout and principles in kitchen and balcony garden, composting and micro greens

### **ASSESSMENT CONTINUOUS EVALUATION,**

### **THEORY AND PRACTICALS (VIRTUAL OR IN LAB) AND ASSIGNMENTS**

- Total duration of Course--- 40 hrs Lecture/ Practicals/ videos
- Credits :02
- Internal Evaluations --- 2 hrs (30min/unit)
- Practicals Assignments to students/expt. At home

# FACULTY OF COMMERCE & MANAGEMENT



# CRYPTO CURRENCY (VAC48)

**Value Added Course**  
**Trading & Stock Market**

**Total Duration: 40hrs**

## Course Objectives:

- To make students understand the basic concepts of cryptocurrency.
- To make students analyze and apply the concepts of trading of financial instruments in the cryptocurrency market.
- To make students design their personal strategies to get maximum optimum out of cryptocurrency trading.

## Course Outcome

After completion of this course the students will be able to:

CO1: Understand the basic concepts of cryptocurrencies.

CO2: Apply the trading strategies to the cryptocurrency trading.

CO3: Analyze and compare the risks and returns associated with various cryptocurrencies.

CO4: Evaluate the various types of trading strategies in the cryptocurrency market.

CO5: Design the various hybrid strategies of trading in crypto market.

## Unit 1

Introduction: What are cryptocurrencies, comparison vs other assets, Market Share, Cryptonomics

## Unit 2

Price Movement: Factors affecting price movement, adoption of cryptocurrencies, Ways to participate in market, Trading Vs Investing

## Unit 3

Trading in Cryptos: Methods of Trading, Algorithm and Automated Trading Tools, Trading Time Frames, Trading Instruments

## Unit 4

Trading Analysis: Technical Analysis, Trend Analysis, Data Representation, Moving Averages, Indicators, Volume and Open Interest,

## Unit 5

Market Participants and Trading Psychology: Participants, Trading Psychology, Trade Management

## Reference Books:

- The Crypto Trader: How anyone can make money trading Bitcoin and other cryptocurrencies by Glen Goodman
- How to Make Money Trading with Candlestick Charts by Balkrishna M Sadekar

## MOOC

<https://courses.dcxlearn.com/p/blockchain-and-cryptocurrency-an-extensive-guide>

# TRADING & STOCK MARKET (VAC49)

**Total Duration: 40hrs**

## **Course Objectives:**

### **Objectives –**

This course provides the participants with adequate knowledge of the stock exchange. The Objective of the course is to equip the participant with necessary stock market theoretical and practical know-how so that students can apply the same in researching equity markets for wealth creation. It introduces the participants to the process of how to find and analyze companies, determine the risk of a stock investment or trade, proper entry and exit time of the stock, understand why markets move the way they do.

### **Unit 1- Introduction to Stock Market.**

Meaning and Definition of Stock markets. Introduction to Financial Markets and its instruments. Indian stock exchange- BSE & NSE. Types of Investment, Working of Stock exchange, Market conditions. Index.

### **Unit 2 – Introduction to capital market.**

Primary market- Introduction, Meaning, Types. Secondary Market- Introduction, Meaning, Types, Functions. Indices. Structure of markets. SEBI- functions, roles, power, Guidelines. Recent Trends in Capital Markets.

### **Unit 3- Fundamental Analysis and Technical Analysis.**

Fundamental analysis-Economic & industry analysis, concept of Business Cycles, Indicators of economic prosperity, Industry analysis, Company analysis, Company valuation.

Technical Analysis: DOW's Theory, Various Technical analysis tools like Moving averages, Volume Analysis, Indicators, RSI, Patten analysis, Candle sticks, Market breadth analysis, Trend analysis.

### **Unit 4- Demat& Mutual Funds.**

Introduction to Mutual Funds – meaning, benefits, fund structure, Asset management company, SIP/ELSS, Tax Implications. Demat – introduction, need, participants, process. Depository.

### **Unit 5- Derivatives and Commodity markets.**

Basic Market Concepts & Mechanics of Cash Market, Various Indexes of the world & its computation, Meaning & types of Derivative Instruments, Forward, future, Option & swaps, Spot v/s Future Market, Growth of Derivative Markets in India-History & Background, ETM & OTC Markets, Types of Traders-Hedger, Arbitrageur & Speculation, Standardization of Derivative Contracts & other basic concepts. Mechanics of Forward & Future Market, Stock Futures & Stock Index Futures in India.

### **Outcome-**

The students will have the working knowledge about the stock market, how to trade in the market and to understand how different financial institutions works.

### **Text & References:**

- Chandra, P.(2017), Investment Analysis & Portfolio Management, Tata McGraw Hill
- Khatri, Dhanesh; (2010); Security Analysis & Portfolio Management; MacMillan India Ltd.
- NISM Series-XII: Securities Markets Foundation (Ebook).

# **SUPPLY CHAIN MANAGEMENT AND LOGISTICS (VAC50)**

**Total Duration: 40hrs**

## **Course Objectives:**

The objective of the course is to impart knowledge and competencies for:

- Designing supply chain strategies.
- Recognizing supply chain integration to support products in the various product lifecycle.
- Balancing logistics, manufacturing, and inventory policies with demand and customer satisfaction.
- Leveraging organizational capabilities and resources across supply chain business processes.
- Designing lean but agile supply chains that integrate green initiatives.
- Implementing e-supply chain management systems.

## **Course outcome:**

The learning goals are to

Understand the tactics to manage the interactions of the business functions..Gain insights on demand management function and its integration with the supply chain..Strategize on the enterprise knowledge and resources across the supply chain activities.

## **Pedagogy:**

- ❖ The learning experience will include lectures, case studies, simulated games, and exercises.

### **UNIT-1**

Supply Chain Management Practices and Competitiveness,-Supply Chain Management Introduction Meaning, Practices and Strategies ,Integrated Supply Chain Management, Supply Chain - Goals and Objectives, Supply Chain Performance, Strategic fit and Competitive advantage Business Environment and Supply Chain Competitiveness, Strategic Supply Chain Management, Drivers and Challenges of Supply Chain

### **UNIT-2**

SCM Strategies- Introduction, Nature and Definitions, Integrated Model of Customer Lifecycle, Demand Management and SCM, Customer Lifecycle and Supply Chain, Demand Chain Management ,Digital Integration, Value Systems and Cross Functional Relationships, SCOR Model, Supply Chain Models „Push and Pull Strategies in Supply Chain Management

### **UNIT-3,**

Facility Decision, Location Planning, Transportation and Warehousing in SCM  
Introduction, nature and characteristics, Facility Decisions and Location Strategy, Factors affecting Facility Network Design Decision Impact of Network Decision and Framework for Facility Design Network Decision, Analytical Methods for Evaluating Locations, Transportation and Warehousing Decisions, Role and Principles of Transportation in a Supply Chain, Transportation Modes and Economies, Warehousing: Objectives, Types and Strategy

### **UNIT-4**

Supply Chain Management for e-Commerce and Digital Supply Chains  
Introduction, Nature and role, Service response logistics and supply chain management in e-business Supply Chain Models for e-commerce, Challenges and Solutions, Reverse Logistics and Refund Policy Information Technology in Supply Chain, IT and its Role in SCM, Digital Supply Chain, IT enabled Supply Chain Transformation

## **Books and references**

1. Donal J Bowersox, David J Closs, M Bixby Cooper (2008), "Supply Chain Logistics Management", 2nd Edition, Tata McGraw Hill, New Delhi.
2. Goldratt, E. M., & Cox, J. (2014). The goal: a process of ongoing improvement. Great Barrington, MA: North River Press.
3. Goldratt, E. M., (2017). Critical Chain: a business novel. 1st Edition, Routledge, CRC Press, Taylor & Francis Group.
4. Michael H. Hugos (2011), "Essentials of Supply Chain Management", 3rd Edition, Wiley Publications, US.
5. Robert B. Handfield, Ernest Nichols (2016), "Introduction to Supply Chain Management", 1st Edition, Pearson Education, New Delhi.
6. Sunil Chopra and Peter Meindl, (2015), "Supply Chain Management: Strategy, Planning and Operation", 6th Edition, Pearson Higher Education, New Delhi.

# FACULTY OF TECHNOLOGY

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# ELECTRIC VEHICLE TECHNOLOGY (VAC51)

## Course outcome:

- To understand about basics of hybrid electric vehicle
- To understand about drives and control.
- Select battery, battery indication system for EV applications
- Design battery charger for an EV

**Total Duration: 40hrs**

**Prerequisites:** Basic Electrical and Electronics Engineering

## MODULE I – Introduction to Hybrid Electric Vehicle

Review of Conventional Vehicle: Introduction to Hybrid Electric Vehicles: Types of EVs, Hybrid Electric Drive-train, Tractive effort in normal driving,

## MODULE II – Electric Drives

Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains, Electric Propulsion unit, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, switched reluctance motor

## MODULE III – Energy Storage

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles:- Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system, Design of Hybrid Electric Vehicle and Plug-in Electric Vehicle,

## MODULE IV – Energy Management System

Energy Management Strategies, Automotive networking and communication, EV charging standards, V2G, G2V, V2B, V2H. Business: E-mobility business, electrification challenges, Business- E-mobility business, electrification challenges,

## MODULE V – Mobility and Connectors

Connected Mobility and Autonomous Mobility- case study Emobility Indian Roadmap Perspective. Policy: EVs in infrastructure system, integration of EVs in smart grid, social dimensions of EVs.

Connectors- Types of EV charging connector, North American EV Plug Standards, DC Fast Charge EV Plug Standards in North America, CCS (Combined Charging System), CHAdeMO, Tesla, European EV Plug Standards,

# MIX DESIGN OF CONCRETE (VAC52)

**Total Duration: 40hrs**

## **Objectives:**

1. To provide an understanding of materials of construction.
2. To provide an understanding of special concrete.
3. To provide an understanding of various IS codes for mix design.

## **Outcomes:**

1. Students are expected to understand materials of construction.
2. Students are expected to know about special concrete.
3. Students are expected to read about various codal provisions for mix design.

## **Unit 1: Constituent Materials**

Cement – Different types – Chemical composition and Properties – Hydration of cement – Tests on cement – IS Specifications – Aggregates – Classification -Mechanical properties and tests as per BIS–Grading requirements–Water–Quality of water for use in concrete.

## **Unit 2: Chemical and mineral admixtures**

Accelerators – Retarders – Plasticizers – Super plasticizers – Water proofers – Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline – Effects on concrete properties.

## **Unit 3: Proportioning of concrete mix**

Principles of Mix Proportioning – Properties of concrete related to Mix Design – Physical properties of materials required for Mix Design – Design Mix and Nominal Mix – BIS Method of Mix Design - Mix Design Examples

## **Unit 4: Fresh and hardened properties of concrete**

Workability – Tests for workability of concrete – Segregation and Bleeding – Determination of strength Properties of Hardened concrete – Compressive strength – split tensile strength – Flexural strength – Stress-strain curve for concrete – Modulus of elasticity – durability of concrete – water absorption – permeability – corrosion test – acid resistance.

## **Unit 5: Special concretes**

Light weight concretes – foam concrete- self compacting concrete – vacuum concrete – High strength concrete – Fibre reinforced concrete – Ferrocement – Ready mix concrete – SIFCON -Shotcrete – Polymer concrete – High performance concrete – Geopolymer Concrete.

## **References:**

1. Introduction to Design and Analysis with Advanced Composite Materials – Stephen R. Swanson (Prentice Hall, New Jersey, 1997)
2. Stress Analysis of Fiber-Reinforced Composite Materials – M.W. Hyer (WCB McGraw Hill, New York).
3. Advanced Strength of Materials – R. Solecki, R.J. Conant (Oxford University Press)
4. Boresi, A.P. and Sidebottom, O.M., "Advanced Mechanics of Materials", John Wiley and Sons.

# SOLAR THERMAL TECHNOLOGY (VAC53)

## 1. Course Educational Objectives

**Total Duration: 40hrs**

Students undergoing this course are expected to:

- Understand the basic principles of thermal technology in various solar thermal systems.
- Understand the solar applications of various systems such as Hot water generation, space heating, distillation and other applications related to solar energy.

## 2. Course Outcomes

CO1 Understand the meaning and kinds of solar collectors, storage tank and collector heat exchange factor

CO2 Understand the working principle of various solar water heating Systems

CO3 Understand the solar space conditioning systems, heat storage configurations and refrigeration systems

CO4 Understand the other solar applications such as solar cooking, chimney and pumping systems and etc

CO5 Understand the importance of cost and estimation of solar systems and its power generation

### UNIT I SOLAR COLLECTORS

Introduction to Solar energy - Flat plate - Evacuated tube – Concentrated - Pool and Air collectors Construction – Function - Suitability – Comparison - Storage Tank - Solar Fluids – Collector Heat Exchanger Factor. 09 hrs

### UNIT II SOLAR WATER HEATING SYSTEMS

Natural, Forced circulation systems, Integral Collector Storage System - Thermosyphon System - Open Loop, Drain Down, Drain Back, Antifreeze Systems - Refrigerant Solar Water Heaters - Solar Heated Pools. 09 hrs

### UNIT III SOLAR SPACE CONDITIONING SYSTEMS

Liquid Type Solar Heating System With / Without Storage - Heat Storage Configurations – Heat Delivery Methods - Air-Type Solar Heating Systems - Solar Refrigeration and Air Conditioning 09 hrs

### UNIT IV OTHER SOLAR APPLICATIONS

Solar Cooking – Distillation - Desalination - Solar Ponds – Solar Passive Architecture – Solar Drying – Solar Chimney – Swimming Pool Heating – Retrofit Water Heaters – Low Flow Pumped systems – Solar vehicles 09 hrs

### UNIT V SOLAR ECONOMICS

Application of economic methods to analyze the feasibility of solar systems to decide project / policy alternatives - Net energy analysis - cost requirements for active and passive heating and cooling - for electric power generation - and for industrial process-heating. 09 hrs

## 3. Text Book

1. J.A. Duffie, W.A. Beckman, Solar Engineering of Thermal Processes, John Wiley Interscience, New York, 2013.

## 9. Reference Book

1. H P Garg, M Dayal, G Furlan, Physics and Technology of Solar Energy- Volume I: Solar Thermal Applications, Springer, 2007.
2. Sukhatme and Nayak, Solar Energy: Principles Of Thermal Collection And Storage, Tata McGraw.Hill, 2008.
3. Bob Ramlow & Benjamin Nusz, Solar Water Heating, New Society Publishing, 2006.
4. John Canivan, Solar Thermal Energy, Sunny Future Press - 2003.
5. Charles Christopher Newton - Concentrated Solar Thermal Energy- Published by VDM Verlag, 2008.
6. H.P.Garg, S.C.Mullick, A.K.Bhargava, D.Reidal, Solar Thermal Energy Storage Springer, 2005.
7. Anne Grete Hestnes, Robert Hastings, Bjarne Saxhof, Solar Energy Houses: Strategies, Technologies Examples, Earthscan Publications, 2003.

# FACULTY OF INFORMATION TECHNOLOGY

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# DIGITAL MARKETING VERSION- 2.0 (VAC54)

## MODULE 1: ON-PAGE OPTIMIZATION

**Total Duration: 40hrs**

- Domain Selection
- Hosting Selection
- Meta Data Optimization
- URL Optimization
- Internal Linking
- 301 Redirection
- 404 Error Pages
- Canonical Implementation
- H1, H2, H3 Tags Optimization
- Image Optimization
- Landing Page Optimization
- No-Follow And Do-Follow
- Creating XML Sitemap
- Robot.txt

### Hands-on Lab

- Analysis of On-Page Site Matrix
- Create a Landing Page
- Implementation on Title Tag, Meta Description, Canonical Tag, Header Tag
- Optimization on Multi-Media file Optimization like Image, Videos, and Infographics
- Landing Page Performance Monitoring and Updation

## MODULE 2: OFF-PAGE OPTIMIZATION

- Link Building Tips & Techniques
- Difference Between White Hat And Black Hat SEO
- Alexa Rank, Domain
- Link Acquisition Techniques
- Directory Submission
- Social Bookmarking Submission
- Search Engine Submission
- Web 2.0 Submission
- Article Submission
- Image Submission
- Video Submission
- Forum Submission
- PPT Submission
- PDF Submission
- Classified Submission
- Business Listing
- Blog Commenting
- Citations
- Profile link creations
- Infographics Submission

### **Hands-on Lab**

- Search Engine Guidelines Based Backlink Creation on Landing Page
- The Increase of Link Juice Value
- Increase and Analysis Domain Authority & Page Authority Factor
- Learn 15 Golden Rules Of Backlink Creation and Improve Quality
- How To Avoid Spam Backlink

### **MODULE 3: LOCAL BUSINESS & GOOGLE MAPPING**

- Creating Local Listing In Search Engine
- Google Places Setup (Including Images, Videos, Map Etc)
- Search Engine Visibility Reports
- Verification Of Listing
- Google Reviews

### **Hands-on Lab**

- Google My Business (GMB) How To Create
- How To Google My Business (GMB) Verify
- Maintain Brand and Reputation on Google My Business (GMB) Listing
- Search Engine Visibility Reports Preparation and Analysis

### **MODULE 4: SOCIAL MEDIA OPTIMIZATION (SMO)**

- Social Media Optimization
- Introduction To Social Media Networks
- Types Of Social Media Websites
- Social Media Optimization Concepts
- Facebook, Google+, LinkedIn,
- YouTube, Pinterest,
- Hashtags
- Image Optimization

### **Hands-on Lab**

- How To Create Strong Profile Account On Social Media
  - Facebook
  - Google+
  - Twitter
  - LinkedIn
  - Instagram
  - Pinterest

## MODULE 5: SOCIAL MEDIA MARKETING (SMM)

- Facebook Optimization
- Fan Page Vs Profile Vs Group
- Creating Facebook Page For Business
- Increasing Fans And Doing Marketing
- Facebook Analytics
- Facebook Advertising And Its Types In Detail
- Creating Advertising Campaigns,
- Payment Modes
- Introduction To Twitter
- Creating Strong Profiles On Twitter
- Followers, ReTweets, Clicks,
- Conversions, HashTags
- LinkedIn Optimization
- What Is LinkedIn?
- Individual Profile Vs. Company Profile
- Branding On LinkedIn
- Marketing On LinkedIn Groups
- Google Plus
- Tools & Techniques
- Google + Groups
- Google Plus For Businesses

### Hands-on Lab

- Social Media Brand Account Creation
  - Google+
  - Facebook
  - Twitter
  - LinkedIn
  - Instagram
  - Pinterest
- Structure of Post
- Post Template Creation
- Content Creation On Social Media Post
- Right Hashtag for your Post
- Analysis of Likes, Share, Comment, Followers, and Retweet
- Increase Brand Awareness
- Identify Target Audience and Convert Goal
- Report Generation on Post Reach
- Facebook Ads
  - Campaign Setup, Performance monitoring, Analysis, and Implementation
  - Right Target Audience Selection
  - Set on Facebook Pixel Tag
  - Set on Remarketing Tag
  - Weekly and Monthly Ads Report Generation

# CLOUD COMPUTING TOOLS AND TECHNIQUES (VAC55)

**Total Duration: 40hrs**

**Course Objective:** This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

## **Course Contents:**

**Module-I:** Cloud Computing Overview Origins of Cloud computing – Cloud components - Essential characteristics – On-demand selfservice, Broad network access, Location independent resource pooling ,Rapid elasticity ,Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

**Module-II:** Cloud Insights Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

**Module-III:** Cloud Architecture- Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service ( PaaS ), features of PaaS and benefits, Infrastructure as a Service ( IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

**Module-IV:** Cloud Simulators- CloudSim and GreenCloud Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud

**Module-V:** Introduction to VMWare Simulator Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

## **Text & References:**

### **Text:**

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter,
- TATA McGraw- Hill , New Delhi – 2010 Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate
- Online - Michael Miller - Que 2008

### **References:**

- Cloud computing for dummies- Judith Hurwitz, Robin Bloor , Marcia Kaufman ,Fern
- Halper, Wiley Publishing, Inc, 2010 Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg,
- Andrzej Goscinski, John Wiley & Sons, Inc. 2011

# DATA ANALYTICS (VAC56)

**Total Duration: 40hrs**

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

1. Describe the life cycle phases of Data Analytics through discovery, planning and building.
2. Learn various Data Analysis Techniques.
3. Implement various Data streams.
4. Understand item sets, Clustering, frame works & Visualizations.
5. Apply R tool for developing real time applications..

## **Unit 1**

**Introduction to Data Analytics:** Sources and nature of data, classification of data (structured, semi-structured, unstructured), characteristics of data, introduction to Big Data platform, need of data analytics, evolution of analytic scalability, analytic process and tools, analysis vs reporting, modern data analytic tools, applications of data analytics.

**Data Analytics Lifecycle:** Need, key roles for successful analytic projects, various phases of data analytics lifecycle – discovery, data preparation, model planning, model building, communicating results, operationalization.

## **Unit 2**

**Data Analysis:** Regression modeling, multivariate analysis, Bayesian modeling, inference and Bayesian networks, support vector and kernel methods, analysis of time series: linear systems analysis & nonlinear dynamics, rule induction, neural networks: learning and generalization, competitive learning, principal component analysis and neural networks, fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, stochastic search methods.

## **Unit 3**

**Mining Data Streams:** Introduction to streams concepts, stream data model and architecture, stream computing, sampling data in a stream, filtering streams, counting distinct elements in a stream, estimating moments, counting oneness in a window, decaying window, Real-time Analytics Platform (RTAP) applications, Case studies – real time sentiment analysis, stock market predictions.

## **Unit 4**

**Frequent Itemsets and Clustering:** Mining frequent itemsets, market based modelling, Apriori Algorithm, handling large data sets in main memory, limited pass algorithm, counting frequent itemsets in a stream, clustering techniques: hierarchical, K-means, clustering high dimensional data, CLIQUE and ProCLUS, frequent pattern based clustering methods, clustering in non-euclidean space, clustering for streams and parallelism.

## **Unit 5**

**Frame Works and Visualization:** MapReduce, Hadoop, Pig, Hive, HBase, MapR, Sharding, NoSQL Databases, S3, Hadoop Distributed File Systems, Visualization: visual data analysis techniques, interaction techniques, systems and applications.

**Introduction to R** - R graphical user interfaces, data import and export, attribute and data types, descriptive statistics, exploratory data analysis, visualization before analysis, analytics for unstructured data.

### **Text & References Books**

1. Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer
2. Anand Rajaraman and Jeffrey David Ullman, *Mining of Massive Datasets*, Cambridge University Press.
3. Bill Franks, *Taming the Big Data Tidal wave: Finding Opportunities in Huge Data Streams with Advanced Analytics*, John Wiley & Sons.
4. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley
5. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big Data Analytics", EMC Education Series, John Wiley
6. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series
7. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier
8. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer
9. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill
10. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Springer
11. Mark Gardner, "Beginning R: The Statistical Programming Language", Wrox Publication
12. Pete Warden, *Big Data Glossary*, O'Reilly
13. Glenn J. Myatt, *Making Sense of Data*, John Wiley & Sons
14. Pete Warden, *Big Data Glossary*, O'Reilly.
15. Peter Bühlmann, Petros Drineas, Michael Kane, Mark van der Laan, "Handbook of Big Data", CRC Press
16. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier

# INDUSTRIAL INTERNET OF THINGS (VAC57)

**Total Duration: 40hrs**

**Objective:** IoT will change industries and transform the way we work and live. Industrial companies are already pivoting from Products to Services leveraging IoT technologies – this digital transformation is more broadly called the Industrial IoT or Industrial Internet. The objective of this subject is to make students aware about this latest technology, its application and to identify future scope for better manufacturing system.

## Content:

**Module: 1** Understanding Industrial Internet of Things (IIoT): Industrial Internet of Things and Cyber Manufacturing Systems, Application map for Industrial Cyber Physical Systems, Cyber Physical Electronics production.

**Module: 2** Modeling of CPS and CMS: Modeling of Cyber Physical Engineering and manufacturing, Model based engineering of supervisory controllers for cyber physical systems, formal verification of system, components, Evaluation model for assessments of cyber physical production systems.

**Module: 3** Architectural Design Patterns for CMS and IIoT: CPS-based manufacturing and Industries 4.0., Integration of Knowledge base data base and machine vision, Interoperability in Smart Automation, Enhancing Resiliency in Production Facilities through CPS. Communication and Networking of IIoT.

**Module: 4** Artificial Intelligence and Data Analytics for manufacturing: Application of CPS in Machine tools, Digital production, Cyber Physical system Intelligence, Introduction to big data and machine learning and condition Monitoring.

**Module: 5** Evaluation of Workforce and Human Machine Interaction: Worker and CPS, Strategies to support user intervention. Introduction to Advance manufacturing and Innovation Ecosystems.

**Module: 6** Application of IIoT: Smart Metering, e-Health Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Plant Automation, Real life examples of IIoT in Manufacturing Sector.

# BLOCKCHAIN ARCHITECTURE DESIGN (VAC58)

**Total Duration: 40hrs**

## **Course Objective:**

1. Understand the basics of digital money and crypto currencies. And Students are able to understand the fundamental concepts, message passing and functioning of logical clocks in a distributed environment.
2. Design the consensus protocol architecture for blockchain.
3. Design consensus process using open-source tool & platform like umbrella project developing a financial application like Paytm and etc.
4. Design an e-commerce application for end users. Design an application which could satisfy most departmental works like digital record identification, land records & etc.

## **Course Outcomes:**

1. This course will be able to successfully pursue higher education in reputed institutions.
2. This course will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering.
3. This course will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.
4. This course will have the ability to explore research areas and produce outstanding contribution in various areas of Systems Engineering.

## **Unit-I**

Introduction to Blockchain: Digital Money to Distributed Ledgers , Design Primitives: Protocols, Security, Consensus, Permissions, Privacy. Blockchain Architecture and Design: Basic crypto primitives: Hash, Signature,) Hashchain to Blockchain, Basic consensus mechanisms 08

## **Unit-II**

Consensus: Requirements for the consensus protocols, Proof of Work (PoW), Scalability aspects of Blockchain consensus protocols Permissioned Blockchains:Design goals, Consensus protocols for Permissioned Blockchains 08

## **Unit-III**

Hyperledger Fabric (A): Decomposing the consensus process , Hyperledger fabric components, Chaincode Design and Implementation Hyperledger Fabric (B): Beyond Chaincode: fabric SDK and Front End (b) Hyperledger composer tool 08

## **Unit-IV**

Use case 1 : Blockchain in Financial Software and Systems (FSS): (i) Settlements, (ii) KYC, (iii) Capital markets, (iv) Insurance Use case 2: Blockchain in trade/supply chain: (i) Provenance of goods, visibility, trade/supply chain finance, invoice management discounting, etc 08

## **Unit-V**

Use case 3: Blockchain for Government: (i) Digital identity, land records and other kinds of record keeping between government entities, (ii) public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain 08

## **Text books:**

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos
2. Blockchain by Melanie Swa, O'Reilly
3. Hyperledger Fabric - <https://www.hyperledger.org/projects/fabric>
4. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits - <https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html>

# FACULTY OF **SCIENCE**

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# RECENT TRENDS IN CLINICAL MICROBIOLOGY (VAC59)

**Total Duration: 40hrs**

## Recent trends in Clinical Microbiology

### **Unit-I**

Surveillance sampling, Operation theatre Sterility testing, Processing of clinical samples for pathogens, Hospital infections and biomedical waste management.

### **Unit-II**

Quality control in microbiology, Laboratory control of antimicrobial therapy, Collection of specimens for bacteriological investigations.

### **Unit-III**

Bacteriological investigations in: (a) PUO (b) Tuberculosis (c) Leprosy (d) Meningitis (e) Eye infections (f) Throat infections (g) Nasal Congestion

### **Unit-IV**

Causative agents and investigations in case of: (a) Food poisoning, gastroenteritis, diarrhoea (b) Respiratory tract infections (c) Sexually transmitted diseases (d) Dental infections (e) Blood transfusion and associated infections (f) Immunoprophylaxis against diseases.

### **Unit -V**

Methods of culture, techniques and organisms encountered in: CSF, blood culture, sputum, pus, urine, stool, UTI, endocarditis, Bone and joint infections.