Shri Vile Parle Kelavani Mandal's

# Dwarkadas J. Sanghvi College of Engineering

*(Autonomous College Affiliated to the University of Mumbai)*

Scheme and detailed syllabus

## Final Year B.Tech

in

## Computer Science and Engineering

## (IoT and Cyber Security with Block Chain Technology)

(Semester VIII)

Prepared by:- Board of Studies in Computer Science and Engineering (IoT and Cyber Security with Block Chain Technology)

***With effect from the Academic Year: 2025-2026***

Shri Vile Parle Kelavani Mandal's
**DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING**
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA: 3.18)

**Scheme for Final Year Undergraduate Program in Computer Science and Engineering (IoT and Cyber Security with Block Chain Technology): Semester VIII (Autonomous)**
**(Academic Year 2025-2026)**

| Sr. No. | Course Code | Course | Teaching Scheme | | | | Semester End Examination (SEE) - A | | | | | | Continuous Assessment (CA) - B | | | | | Aggregate (A+B) | Credits Earned | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory (Hrs.) | Practical (Hrs.) | Tutorial (Hrs.) | Credits | Duration (Hrs) | Theory | Oral | Pract | Oral & Pract | SEE Total (A) | Term Test 1 (TT1) | Term Test 2 (TT2) | Total (TT1 + TT2) | Term work | CA Total (B) | | | |
| 1 | DJS22ICC801 | Blockchain for Enterprise | 3 | – | – | 3 | 2 | 65 | – | – | – | 65 | 20 | 15 | 35 | – | 35 | 100 | 3 | 4 |
| | DJS22ICL801 | Blockchain for Enterprise Laboratory | – | 2 | – | 1 | 2 | – | 25 | – | – | 25 | – | – | – | 25 | 25 | 50 | 1 | |
| 2 | DJS22ICC802 | Ethical Hacking and Digital Forensics | 3 | – | – | 3 | 2 | 65 | – | – | – | 65 | 20 | 15 | 35 | – | 35 | 100 | 3 | 4 |
| | DJS22ICL802 | Ethical Hacking and Digital Forensics Laboratory | – | 2 | – | 1 | 2 | – | 25 | – | – | 25 | – | – | – | 25 | 25 | 50 | 1 | |
| 3@ | DJS22ICC8011 | Computer Vision | 3 | – | – | 3 | 2 | 65 | – | – | – | 65 | 20 | 15 | 35 | – | 35 | 100 | 3 | 4 |
| | DJS22ICL8011 | Computer Vision Laboratory | – | 2 | – | 1 | 2 | – | 25 | – | – | 25 | – | – | – | 25 | 25 | 50 | 1 | |
| | DJS22ICC8012 | Large Language Models | 3 | – | – | 3 | 2 | 65 | – | – | – | 65 | 20 | 15 | 35 | – | 35 | 100 | 3 | |
| | DJS22ICL8012 | Large Language Models Laboratory | – | 2 | – | 1 | 2 | – | 25 | – | – | 25 | – | – | – | 25 | 25 | 50 | 1 | |
| | DJS22ICC8013 | Edge and Fog Computing | 3 | – | – | 3 | 2 | 65 | – | – | – | 65 | 20 | 15 | 35 | – | 35 | 100 | 3 | |
| | DJS22ICL8013 | Edge and Fog Computing Laboratory | – | 2 | – | 1 | 2 | – | 25 | – | – | 25 | – | – | – | 25 | 25 | 50 | 1 | |
| 4# | DJS22ILO8021 | Project Management | 3 | – | – | 3 | 2 | 65 | – | – | – | 65 | 20 | 15 | 35 | – | 35 | 100 | 3 | 3 |
| | DJS22ILO8022 | Entrepreneurship Development and Management | | | | | | | | | | | | | | | | | | |
| | DJS22ILO8023 | Corporate Social Responsibility | | | | | | | | | | | | | | | | | | |
| | DJS22ILO8024 | Human Resource Management | | | | | | | | | | | | | | | | | | |
| | DJS22ILO8025 | Corporate Finance Management | | | | | | | | | | | | | | | | | | |
| | DJS22ILO8026 | Logistic and Supply Chain Management | | | | | | | | | | | | | | | | | | |
| | DJS22ILO8027 | IPR and Patenting | | | | | | | | | | | | | | | | | | |
| | DJS22ILO8028 | Digital Marketing Management | | | | | | | | | | | | | | | | | | |
| | DJS22ILO8029 | Environmental Management | | | | | | | | | | | | | | | | | | |
| | DJS22ILO8030 | Labour and Corporate Law | | | | | | | | | | | | | | | | | | |
| 5 | DJS22ICP803 | Project Stage II | – | 10 | – | 5 | 2 | – | – | – | 100 | 100 | – | – | – | 100 | 100 | 200 | 5 | 5 |
| 6 | DJS22A4 | Disaster Management and Preparedness | 2 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| | | Total | 14 | 16 | 0 | 20 | 16 | 260 | 75 | 0 | 100 | 435 | 80 | 60 | 140 | 175 | 315 | 750 | 20 | |

Prepared by | Checked by | Head of the Department | Vice Principal | Principal

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | Final Year B.Tech | Semester : VIII |
|---|---|---|
| Course : Blockchain for Enterprise | Course Code: DJS22ICC801 | |
| Course Laboratory: Blockchain for Enterprise Laboratory | Course Code: DJS22ICL801 | |

| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment (B) | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 |
| | | | | Laboratory Examination | | | Term Work | | | | |
| 3 | 2 | -- | 4 | Oral | Practical | Oral & Practical | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | | 50 |
| | | | | 25 | -- | -- | 15 | 10 | 25 | | |

**Prerequisite:**

1. Introduction to Blockchain Technology
2. Blockchain for Cybersecurity
3. Cloud Computing Laboratory

**Course Objectives:** The objective of the course is

1. To understand enterprise blockchain architecture and frameworks.
2. To explore blockchain applications in enterprise ecosystems such as supply chain, finance, and healthcare.
3. To study interoperability, scalability, and governance challenges in enterprise blockchain systems.
4. To design and deploy enterprise-grade blockchain solutions ensuring security, privacy, and performance.

**Course Outcomes:** On completion of the course, learner will be able to:

1. Describe the role and need for blockchain in enterprise systems.
2. Analyze and differentiate blockchain architecture for enterprise-grade applications.
3. Design and Develop enterprise smart contracts using for business processes automation.
4. Evaluate scalability, privacy, and interoperability of enterprise blockchain networks.
5. Integrate blockchain with existing enterprise IT infrastructure.
6. Develop prototype of blockchain-based solutions for real-world industrial challenges.

**Detailed Syllabus:**

| Unit | Description | Duration |
|---|---|---|
| 1 | **Introduction to Enterprise Blockchain**<br>Concept of Enterprise blockchain – definition, characteristics, and benefits, Business process, automation using blockchain, Role of blockchain in digital transformation, Enterprise Needs: Transparency, Traceability, Compliance, and Efficiency, Blockchain adoption in enterprises.<br>Blockchain-as-a-Service (BaaS) Overview: AWS, Azure, IBM Blockchain | 08 |
| 2 | **Enterprise Blockchain Frameworks**<br>Architecture and components of Hyperledger Besu, Ethereum for Enterprises: Private Ethereum, Quorum, and Corda Enterprise and its Contract States Model, Consensus Mechanisms for Enterprise ( Raft, Proof of Authority), Comparative study of frameworks<br><br>**Identity management in enterprise blockchain**: Decentralized digital identity, Decentralized Identifiers (DIDs), DID Architecture and work flow, Blockchain based DID Registry, Verifiable Credentials (VC), VC Trust Model, Combining DIDs and VCs, Hyperledger Aries:Use of Blockchain for VCs | 08 |
| 3 | **Enterprise Integration and Smart Contract Automation**<br>Integration with legacy systems (ERP, CRM, SCM); Blockchain–cloud integration, Interoperability standards: Polkadot, Cosmos, and Hyperledger Cactus, API gateways and oracles for enterprise data synchronization.<br>Enterprise Smart Contracts: Design Patterns and Best Practices, Solidity for Business Logic Automation, Chaincode in Hyperledger Fabric (Go/Node.js) | 06 |
| 4 | **Blockchain Interoperability**<br>Interoperability in Permissionless and Permissioned Blockchains, Cross Chain Asset Transfer, Trusted Third Party (TTP) based Asset Transfer, Cross Chain Asset Exchange, Atomic Cross-chain Swaps, Hashlock and Timelock, HTLC: Hashed Timelock Contract, Multi Party Atomic Cross chain Swap, Interoperation in Permissioned Blockchains-Use Case, Verifiable Data Transfer in Permissioned Blockchain,<br>Hyperledger Indy: Indy Key Characteristics, Overview and Projects | 07 |
| 5 | **Blockchain Integration with Enterprise IT Infrastructure**<br>RESTful and gRPC APIs for Blockchain, Integration with ERP/CRM Systems (SAP, Salesforce, Oracle), Blockchain and Cloud Integration: AWS Managed Blockchain, Azure Blockchain Service,<br>Blockchain and IoT Integration Platforms: AWS and Azure services and case study Blockchain and AI/ML for Predictive Analytics and Fraud Detection using AWS Sagemaker and Azure ML studio | 07 |
| 6 | **Blockchain Applications in Enterprise Domains**<br><br>Regulatory Landscape: GDPR, DPDP Act, and Data Governance in Blockchain Enterprise NFTs and Digital Twin Use Cases,<br>Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Block chain enabled Trade, Supply Chain Financing, Identity on Block chain, Blockchain in energy sector, Blockchain in governance | 06 |
| | **Total** | 42 |

| List of Laboratory Experiments: | |
|---|---|
| **Sr. No.** | **Suggested Experiments** |
| 1 | Case study: Analyse enterprise motivations (transparency, traceability, compliance) and compare BaaS offerings (AWS, Azure, IBM). |
| 2 | To design and implement a decentralized web application that allows a user to store and retrieve data on the Ethereum blockchain using Solidity and a basic web interface. |
| 3 | To develop a blockchain-based voting application that records votes securely and transparently using Solidity smart contracts and a web-based frontend |
| 4 | Deploy a sample permissioned network using a cloud BaaS and run basic transactions |
| 5 | Setup a Private Ethereum Network using Ganache and MetaMask |
| 6 | Build a simple CorDapp demonstrating the contract-states model. |
| 7 | Develop and Deploy a Smart Contract for Supply Chain Asset Tracking |
| 8 | Develop and deploy chaincode (Go/Node.js) to automate an enterprise process |
| 9 | Write secure Solidity contracts implementing standard enterprise patterns (Ownable, Pausable, Upgradeable proxy) for a business workflow. |
| 10 | Integrate off-chain enterprise data via an oracle into smart contracts |
| 11 | Develop an Enterprise NFT-based Digital Asset Registry |
| 12 | Implement DID creation, registration, and resolution using tools like Hyperledger Aries or Indy and demonstrate decentralized digital identity authentication. |
| 13 | Issue VCs using a blockchain-based registry; allow other nodes to verify and trust credentials based on the VC trust model |
| 14 | Implement a Hashed Timelock Contract for asset exchange between two simulated blockchains |
| 15 | Use Azure ML Studio to create predictive analytics workflow using blockchain transaction data |
| 16 | Build and deploy a Solidity smart contract for a business scenario (e.g., automated invoicing) on private Ethereum(or testnet) |
| 17 | Miniproject: (A group of 3 to 4 students is required to develop an Enterprise application using blockchain technology and submit report). |

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

**Books Recommended:**

**Text Books:**

1. Narayan Prusty, Blockchain for Enterprise, 1st Edition, Packt Publishing, ISBN: 9781788477130, 2018
2. Nitin Gaur, Luc Desrosiers, Venkatraman Ramakrishna, Petr Novotny, Arthur G. Gauer, Blockchain for Business – A Practical Guide to the Next Digital Revolution, 1st Edition, O'Reilly Media, ISBN: 9781492042791, 2020.
3. Imran Bashir, Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and DeFi, 4th Edition, Packet Publishing, ISBN: 9781839218262, 2023.
4. Joseph Holbrook, Architecting Enterprise Blockchain Solutions, 1st Edition, Packet Publishing, ISBN: 9781839217715, 2020.

5. Imran Bashir , Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more, 3rd Edition, Packet Publishing, ISBN: 9781839213199, 2020

**Reference Books:**

1. Alessandro Parisi , Securing Blockchain Networks like Ethereum and Hyperledger Fabric, Packt Publishing, ISBN: 9781838646486, 2020.
2. Nitin Gaur, Hands-On Blockchain with Hyperledger: Building decentralized applications with Hyperledger Fabric and Composer, Packt Publishing, 2018.
3. Richard Ma, Jan Gorzny, Edward Zulkoski, Kacper Bak, Olga V. Mack, Fundamentals of Smart Contract Security, Momentum Press, 2019.
4. Kevin Werbach, the Blockchain and the New Architecture of Trust, the MIT Press, 2018.

**Web resources:**

1. Blockchain-as-a-Service (BaaS): https://crustlab.com/blog/blockchain-as-a-service/
2. AWS Managed Blockchain: https://aws.amazon.com/managed-blockchain/
3. Microsoft Azure Blockchain Documentation: https://learn.microsoft.com/en-us/azure/blockchain/
4. IBM Blockchain Platform: https://www.ibm.com/blockchain/platform
5. Enterprise Ethereum Alliance (EEA): https://entethalliance.org/
6. W3C Decentralized Identifiers (DID) and Verifiable Credentials (VCs): https://www.w3.org/TR/did-core/, https://www.w3.org/TR/vc-data-model/

**Online Courses: NPTEL / Swayam**

1. Blockchain and its Applications, By Prof. Sandip Chakraborty, Prof. Shamik Sural, IIT Kharagpur **https://onlinecourses.nptel.ac.in/noc23_cs47/preview**
2. Blockchain Architecture Design and Use Cases, By Prof. Sandip Chakraborty & Dr. Praveen Jayachandran | IIT Kharagpur and IBM, **https://onlinecourses.nptel.ac.in/noc19_cs63/preview**
3. Blockchain, By Dr.Mayank Aggarwal ,Gurukul Kangri Vishwavidyalaya,Haridwar **https://onlinecourses.swayam2.ac.in/aic21_ge01/preview**
4. Blockchain Council – Enterprise Blockchain Certification https://www.blockchain-council.org/

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

**Laboratory: (Term work)**

Term work shall consist of minimum 6 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 10 Marks
ii. Assignments (Quiz, Descriptive/Analytical Questions): 5 marks
iii. Miniproject (Implementation, Report): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

| Prepared by | Checked by | Head of the Department | Vice Principal | Principal |
|---|---|---|---|---|

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| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | Final Year B.Tech | Semester : VIII |
|---|---|---|
| Course : Ethical Hacking and Digital Forensics | Course Code: DJS22ICC802 | |
| Course Laboratory: Ethical Hacking and Digital Forensics Laboratory | Course Code: DJS22ICL802 | |

| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment (B) | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | |
| | | | | 65 | | | 20 | 15 | 35 | 100 |
| | | | | Term Work | | | Laboratory Examination | | | |
| 3 | 2 | -- | 4 | Oral | Practical | Oral & Practical | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | 50 |
| | | | | 25 | -- | -- | 15 | 10 | 25 | |

**Prerequisite:** Cryptography and Security, Computer Networks, VAPT.

**Course Objectives: Students will try:**

1. To understand ethical hacking and different phases of an attack.
2. Recognize the System Hacking strategies in Ethical manner.
3. Awareness of Network Hacking and its issues.
4. Understand the fundamental of Cyber Forensics.
5. Work with different tools and techniques associated with Cyber Forensics.
6. Analyze and validate the forensics data.

**Course Outcomes: Student will able to:**

1. Define the concept of ethical hacking and explore different phases in ethical hacking
2. Apply the System Hacking strategies in Ethical manner.
3. Analyze and mitigate Network Hacking issues.
4. Understand the fundamental of Cyber Forensics
5. Examine the tools and techniques used for acquiring digital evidence.
6. Assess and authenticate digital evidence data.

| Detailed Syllabus: (unit wise) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Introduction to Ethical Hacking:**<br>Introduction- Ethical Hacking Terminology, Types of hacking technologies, Elements of Security, Phases of ethical hacking, Types of Hacker Attacks, Hacking Impacts, The Hacker Framework: Planning the test, Sound Operations, System Hacking, Malware Threats, Sniffing, Email Tracking. | 05 |
| 2 | **Enumeration and vulnerability analysis**<br>Enumeration Concepts - NetBIOS Enumeration - SNMP, LDAP, NTP, SMTP, Web Enumeration ,Web Application Directory Enumeration and DNS Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows - Linux OS Vulnerabilities - Vulnerabilities of Embedded Oss. | 08 |
| 3 | **Network hacking**<br>Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialing, Brute Force Scripting, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media. | 07 |
| 4 | **Introduction to Cyber forensics**<br>Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Role of ECD and ICT in Cybercrime - Classification of Cyber Crime. The Present and future of Cybercrime, Cyber Forensics, Steps in Forensic Investigation, Forensic Examination Process,<br>Types of CF techniques: Forensic duplication and investigation, Forensics Technology and Systems, Understanding Computer Investigation, Data Acquisition. | 08 |
| 5 | **Evidence collection and forensics tools**<br>Processing Crime and Incident Scenes – Digital Evidence, Sources of Evidence, Working with File Systems: Registry, Artifacts, Current Computer Forensics Tools, Software/ Hardware Tools :Forensic Suite, Acquisition and Seizure of Evidence from Computers and Mobile Devices, Chain of Custody- Forensic Tools | 07 |
| 6 | **Analysis and Validation**<br>Validating Forensics Data , Data Hiding Techniques, Performing Remote Acquisition, Network Forensics, Email Investigations, Cell Phone and Mobile Devices Forensics , Analysis of Digital Evidence ,Admissibility of Evidence ,Cyber Laws in India , Case Studies | 07 |
| | **Total** | 42 |

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**List of experiments**

| Sr. No | Experiment |
|---|---|
| 1 | To study and implement session hijacking / man in the middle (MiTM) attack in a controlled virtual environment. Recommended Tools: Ettercap / Bettercap |
| 2 | To perform static data acquisition from Windows OS<br>Recommended Tool: FTK Imager |
| 3 | To acquire live data from Windows OS<br>Recommended Tool: FTK Imager, TCP Dump |
| 4 | Windows Recycle Bin Forensics |
| 5 | To perform analysis of Forensic Duplicates<br>Recommended Tool: Autopsy, bulk Extractor |
| 6 | Data Carving using open source tools • Foremost • Scalpel • Jpegcarver |
| 7 | USB Device Forensics using • USBDeview • USB Detection |
| 8 | Restore the Evidence Image using EnCase Forensics Imager. |
| 9 | Generate a Timeline Report Using Autopsy |
| 10 | File inclusion attack simulation using dvwa, lamp stack in Debian . |
| 11 | To setup a NETAPI exploit and a persistent backdoor using Metasploit |
| 12 | Case Study on Chain of Custody and Evidence Integrity Validation using Hash Values<br>Recommended Tool: Hashdeep, md5sum |

**Text Books:**

1. EC-Council "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning,2020
2. Niranjan Reddy."Practical Cyber Forensics: An incident- Based Approach to Forensic Investigations", APress,2019
3. Casey E. "Digital evidence and computer crime: Forensic science, computers and the internet" Academic Press 2019.
4. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Tata Mc Graw Hill Publishers, 2010.
5. Niranjan Reddy "Practical Cyber Forensics- An Incident-Based Approach to Forensic Investigations" Academic Press 2019.

**References:**

1. Kevin Smith, "Hacking How to Hack - The ultimate Hacking Guide", Hacking Intelligence 2015
2. Kevin Beaver, "Hacking for dummies" Wiley publication 2019
3. Jennifer Bayuk "CyberForensics - Understanding Information Security Investigation" Springer 2012
4. Eoghan Casey "Handbook of Digital Forensics and Investigation" Elsevier academic press 2013

**Web resources::**

1.https://freevideolectures.com/course/4070/nptel-ethical-hacking
2. https://owasp.org/www-project-top-ten/
3.https://www.computersecuritystudent.com/
4.http://www.opentechinfo.com/learn-use-kali-linux/
5.https://pentesterlab.com
6. https://www.exploit-db.com/google-hacking-database Evaluation Scheme

**Online Courses: NPTEL / Swayam :**

1. Ethical Hacking by Prof. Indranil Sengupta IIT Kharagpur
   https://onlinecourses.nptel.ac.in/noc25_cs142/
2. Information Security and Cyber Forensics by Prof. Pratosh Bansal
   https://onlinecourses.swayam2.ac.in/cec25_ge02/
3. Introduction to Cyber Security by Dr. Jeetendra Pande
   https://onlinecourses.swayam2.ac.in/nou25_cs18/

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

**Laboratory: (Term work)**

Term work shall consist of minimum 8 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks
ii. Journal documentation (Write-up and/or Assignments): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

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NAAC Accredited with "A" Grade (CGPA: 3.18)

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | Final Year B.Tech | Semester : VIII |
|---|---|---|
| Course : Computer Vision | Course Code: DJS22ICC8011 | |
| Course Laboratory: Computer Vision Laboratory | Course Code: DJS22ICL8011 | |

| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment (B) | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 |
| | | | | Laboratory Examination | | | Term Work | | | | |
| 3 | 2 | -- | 4 | Oral | Practical | Oral & Practical | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | | 50 |
| | | | | 25 | -- | -- | 15 | 10 | 25 | | |

**Prerequisite:**

1. Python Programming
2. Statistics for Engineers.

**Course Objectives:** The objective of the course is

1. To understand the fundamentals of digital images, including sampling, quantization, image types, color models, and basic pixel relationships.
2. To learn and apply various image enhancement techniques in both spatial and frequency domains for improving image quality.
3. To explore image segmentation, morphological operations, and restoration techniques for analyzing and processing images.
4. To study feature detection, description, and motion analysis methods, and apply them in practical image processing and computer vision tasks.

**Course Outcomes**: On completion of the course, learner will be able to:

1. Explain the core concepts of digital imaging including sampling, quantization, image types, file formats, color models, and pixel relationships.
2. Apply point processing and spatial/frequency domain filtering techniques for image enhancement using appropriate transforms and filters.
3. Analyze various image segmentation techniques such as edge detection, region-based methods, clustering, and thresholding for partitioning digital images.

4. Evaluate morphological operations and restoration techniques to improve and recover degraded or noisy images.
5. Design feature extraction and description methods for effective image representation.
6. Implement basic algorithms for both optical flow calculation and stereo from motion techniques.

**Detailed Syllabus:**

| Unit | Description | Duration |
|---|---|---|
| 1 | **Core Concepts of Digital Imaging:** Digital Image : Sampling and Quantization, Image Types, Image File format, Color Image Model. Basic Relationships Between Pixels. | 04 |
| 2 | **Image Enhancement:** **Point processing:** Image Negative, Thresholding, Gray- level slicing with and without background, power law and log transform, Contrast Stretching, Histogram equalization and Histogram Stretching. **Neighbourhood Processing (Spatial Domain):** Low pass averaging filter, Median filter, High pass filtering, High Boost Filtering, Zooming. **Neighbourhood Processing (Frequency Domain):**1-D DFT, 2-D DFT, Low and High pass filter: Ideal, Butterworth, Gaussian, Homomorphic Filtering. | 10 |
| 3 | **Image Segmentation using Discontinuity:** Gradient computation using Roberts, Prewitt, Sobel and Compass. LOG, Canny Edge Detection. Hough transform. **Region Based Segmentation:** Region Growing, Splitting, Merging, Split and Merge. **Segmentation Based on Global Thresholding:** Global Thresholding, Local Thresholding, Otsu's Method, Illumination effect, Adaptive Thresholding, Illumination effect, Adaptive Thresholding. Clustering (Mean Shift), Watershed Algorithm, Fuzzy C-Means | 10 |
| 4 | **Morphology:** Dilation, Erosion, Opening, Closing, Top Hat, Black Hat, Hit Miss, Thinning and Thickning. **Restoration:** Noise models – Mean Filters – Order Statistics – Adaptive filters | 06 |
| 5 | **Feature Detection & Description:** Interest or Corner Point Detectors - Harris and Hessian, Histogram of Oriented Gradients, GLOH, Scale Invariant Feature Transform (SIFT), Speeded up Robust Features (SURF), Saliency, Scale-Space Analysis - Image Pyramids. | 07 |
| 6 | **Optical Flow and Motion Analysis:** Optical Flow, Interpretation of Optical Fields, Using focus of expansion to avoid collision, Time to adjacency analysis, Basic difficulties with optical flow models, Stero from Motion. | 05 |
| | **Total** | 42 |

| List of Laboratory Experiments: | |
|---|---|
| **Sr. No.** | **Suggested Experiments** |
| 1 | Study of basic image operations – reading, displaying, and writing images using OpenCV. |
| 2 | Perform image enhancement techniques: image negative, log and power-law transformation., Contrast stretching, histogram equalization, and histogram specification. |
| 3 | Implement low-pass and high-pass filters (Ideal, Butterworth, Gaussian). |
| 4 | Perform edge detection using Roberts, Prewitt, Sobel, and Compass operators. |
| 5 | Apply Laplacian of Gaussian (LoG) and Canny edge detector. |
| 6 | Apply mean shift clustering for image segmentation. |
| 7 | Perform global and local thresholding. |
| 8 | Implement Otsu's method for automatic threshold selection. |
| 9 | Apply top-hat and black-hat transformations. |
| 10 | Simulate noise models (Gaussian, salt-and-pepper, speckle). |
| 11 | Apply mean, median, and adaptive filters for noise removal. |
| 12 | Implement Harris Corner Detector. |
| 13 | Compute optical flow using Lucas-Kanade or Horn-Schunck methods. |
| 14 | Mini Project (A group of 3 to 4 students is required to develop an application using Image processing and Computer Vison technology and submit report). |

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

**Text Books:**

1. Rafel C. Gonzalez and Richard E. Woods, Digital Image Processing, Pearson Education Asia, 4th Edition, 2018.
2. Richard Szeliski's Computer Vision: Algorithms and Applications is the 2nd edition (2022), published by Springer, New York.

**Reference Books:**

1. B. K. P. Horn, Robot Vision, MIT Press (Cambridge), 2024
2. Dr. Reinhard Klette, Concise Computer Vision: An introduction in Theory and Algorithms by Learning, Springer, 2014
3. Joseph Howse and Joe Minichino, Learning OpenCV 5 Computer Vision with Python, Packt Publishing, 2023
4. S. Jayaraman, E. Esakkirajan and T. Veerkumar, Digital Image Processing, Tata McGraw Hill Education Private Ltd, 1st Edition, 2017.
5. Anil K. Jain, Fundamentals and Digital Image Processing, Pearson Education, 1st Edition, 2015.

**Web resources:**

1. Image Enhancement in Spatial Domain
   https://medium.com/@gokcenazakyol/what-is-image-enhancement-image-processing-3-32a813087e0a
   https://www.pace.edu.in/img/course/Module_2-img.pdf
2. Image Enhancement in Frequency Domain
   https://iipvapi.com/spatial-domain-and-frequency-domain-for-image-enhancement
3. Image Segmentation
   https://www.ibm.com/topics/image-segmentation
4. Morphological Image Processing
   https://www.cs.auckland.ac.nz/courses/compsci773s1c/lectures/ImageProcessinghtml/topic4.htm
5. Image Transforms
   https://homepages.inf.ed.ac.uk/rbf/HIPR2/tranops.htm
6. Optical Flow
   https://www.doc.ic.ac.uk/~dfg/vision/v16.html

**Online Courses: NPTEL / Swayam:**

1. Computer Vision By Prof. Jayanta Mukhopadhyay, IIT Kharagpur
   https://onlinecourses.nptel.ac.in/noc25_cs143/preview
2. Deep Learning for Computer Vision, By Prof. Vineeth N Balasubramanian , IIT Hyderabad
   https://onlinecourses.nptel.ac.in/noc21_cs93/preview
3. Computer Vision and Image Processing - Fundamentals and Applications By Prof. M. K. Bhuyan, IIT Guwahati.
   https://onlinecourses.nptel.ac.in/noc23_ee39/preview

**Semester End Examination (A):**

**Theory:**

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

**Laboratory:**

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

**Laboratory: (Term work)**

Term work shall consist of minimum 6 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 10 Marks
ii. Assignments (Quiz, Descriptive/Analytical Questions): 5 marks
iii. Miniproject (Implementation, Report): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology) | | | | | | | | | Final Year B.Tech | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|
| Course : Large Language Models | | | | | | | | | Course Code: DJS22ICC8012 | |
| Course: Large Language Models Laboratory | | | | | | | | | Course Code: DJS22ICL8012 | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | Total marks (A+ B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | | Term Test 2 | Total | |
| | | | | 65 | | | 20 | 15 | 35 | 100 |
| | | | | Laboratory Examination | | | Term work | | | |
| 3 | 2 | -- | 4 | Oral | Practical | Oral & Practical | Laboratory Work | Tutorial / Mini project / presentation / Assignment | Total Term work | 50 |
| | | | | 25 | -- | -- | 15 | 10 | 25 | |

**Pre-requisite:**

1. Machine Learning
2. Deep Learning

**Course Objectives:** The objective of the course is to:

1. Introduce the fundamental concepts and applications of Generative AI.
2. Provide in-depth understanding of Transformer architecture, the core building block of most Large Language Models (LLMs).
3. Explore various LLM architectures and techniques like BERT, prompt engineering, and fine-tuning.
4. Identify Multimodal LLMs that can process and understand different data modalities.

**Course Outcomes:** On completion of the course, learners will be able to:

1. Introduce the fundamental concepts and applications of Generative AI.
2. Explore various LLM architectures and techniques like BERT, GPT-3, T5.

3. Describe the role of Large Reasoning model in solving complex task reasoning and memory retention.

4. Apply prompt engineering techniques for effective LLM interaction

5. Analyze the concept of Retrieval Augmented Generation (RAG) and its role in LLMs.

6. Explore the different data modalities using Multimodal Architectures.

**Detailed Syllabus:**

| Unit | Description | Duration |
|---|---|---|
| 1 | **Introduction to Generative AI &Transformer Architecture:** Domains of Generative AI, Small language model, Text Generation, Image Generation, Music Generation, Video Generation. Limitations of RNN & LSTM, Tokenization, Transformer Architecture: encoders, decoders, attention mechanisms - types, Self-attention vs Flash Attention, feed-forward layer, Reinforcement Learning with AI Feedback (RLAIF), Reinforcement Learning from Human Feedback (RLHF) | 08 |
| 2 | **Language Models - Unveiling the Power of Words:** BERT (Bidirectional Encoder Representations from Transformers) and its applications, exploring other notable LLM architectures (e.g.GPT-3, T5), Mixture of Experts (MoE), Various benchmarks to evaluate LLMs – perplexity, BLEU score, Needle in a Haystack | 07 |
| 3 | **Large Reasoning Models:** Deep seek- v2: Multi head Latent Attention, Deep seek MoE, Knowledge 5 Distillation, Mistral 7-B Architecture: sliding Window attention, Grouped Query Attention. Titans: Learning to memorize at test time, Knowledge Distillation, QWQ models. | 06 |
| 4 | **Prompt Engineering &Agentic AI** Introduction to prompt, examples of prompt, prompt engineering, prompt techniques, zero shot, one shot, few-shot learning, Agentic AI- a chain of thought , ReAct , self-consistency, Tree of thought, Multimodal CoT, Graph prompting. Large Action Models(LAMs), LLM based Agents, Auto Gen | 06 |
| 5 | **Retrieval Augmentation & Generation (RAG) and Fine-tuning for LLMs :** Understanding Retrieval and vector, vector storage: vector indexing and retrieval Algorithms: Annoy, HSNV, Inverted File System, LSH, vector quantization techniques: Scalar, Product, Binary, vector libraries, vector databases, Loading and retrieving in Lang Chain, Document loaders, Retrievers in Lang Chain. Fine-tuning: Quantization, PEFT. Full-Finetuning vs LoRA vs QLoRA, Fine-Tuning LLMs for different downstream tasks. | 08 |
| 6 | **Multimodal Architectures - Beyond Text** Introduction to Multimodal LLMs, Exploring architectures for Multimodal LLMs: Vision Transformer, Next GPT, Applications of Multimodal LLMs (e.g., image captioning, video summarization). Multi-task LLMs, Empowering Time Series Analysis with Large Language Models, Applications of Time Series LLMs | 07 |
| | **Total** | 42 |

| List of Laboratory Experiments: | |
|---|---|
| **Sr.No.** | **Suggested Experiments** |
| 1 | Case study on Applications of Generative AI |
| 2 | Case study on role of Artificial Intelligence in achieving the Sustainable Development Goals |
| 3 | Fine Tuning Pre-trained Model On Custom Dataset (synthetic data) Using Transformer |
| 4 | Build your own LLM from scratch. |
| 5 | Query PDF using Lang Chain and Pine cone |
| 6 | Fine Tune Mistral7-B With Custom Dataset Using LoRA And QLoRA Techniques |
| 7 | Using in-built tools and creating custom tools for ReAct agent in Langchain. |
| 8 | Question Answering Application using LLM based agents. |
| 9 | Understanding various retrievers in Langchain. |
| 10 | Case study on comparison of Large Reasoning Models |
| 11 | Understanding multimodal models like Gemini vision |
| 12 | Build a simple multimodal generative model that combines text and image inputs to generate captions |
| 13 | Mini project ((A group of 3 to 4 students is required to develop an application using LLM models and submit report) |

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

**Books Recommended:**

**Text Books**

1. Ben Auffarth, "Generative AI with LangChain: Build large language model (LLM) apps with Python, ChatGPT, and other LLMs" by Packt Publishing, 2023.
2. Valentina Alto, "Modern Generative AI with ChatGPT and OpenAI Models", by Packt Publishing, 2023.
3. Jay Alammar, Maarten Grootendorst, "Hands-On Large Language Models", by O'Reilly, 2023
4. Thushan Ganegedara, "Natural Language Processing with TensorFlow", by Packt Publishing, Second Edition, 2022.

**Reference Books**

1. David Foster, "Generative Deep Learning", O'Reilly, 2020.
2. Lewis Tunstall, Leandro von Werra & Thomas Wolf," Natural Language Processing with Transformers", 2022.
3. Sebastian Raschka, "Build a Large Language Model (From Scratch)", ISBN 9781633437166

**Web resources:**

1. Mixture of Experts: Mixture of Experts Explained (huggingface.co)
2. PEFT:Efficient Model Fine-Tuning for LLMs: Understanding PEFT by Implementation | by Shivansh Kaushik | Medium
3. Various benchmarks to evaluate LLMs: LLM Benchmarks: Understanding Language Model Performance (humanloop.com)
4. Various benchmarks to evaluate LLMs: LLM Benchmarks: Understanding Language Model Performance (humanloop.com)

5. Types of attention mechanism: Understanding and Coding the Self-Attention Mechanism of Large Language Models From Scratch (sebastianraschka.com)
6. Agents| RAG: Intro to LLM Agents with Langchain: When RAG is Not Enough | by Alex Honchar | Mar, 2024 | Towards Data Science
7. React| Agent: Teaching LLMs to Think and Act: ReAct Prompt Engineering | by Bryan McKenney | Medium
8. LLM based Agents : Superpower LLMs with Conversational Agents | Pinecone
9. RAGAS: Evaluating RAG pipelines with Ragas + LangSmith (langchain.dev)
10. Model distillation: LLM distillation demystified: a complete guide | Snorkel AI
11. Sentence classifier |BERT: Classify text with BERT | Text | TensorFlow

**Online Courses: NPTEL / Swayam**

1. Course on- Introduction to Large Language Models (LLMs)- By Prof. Tanmoy Chakraborty, Prof. Soumen Chakraborti , IIT Delhi, IIT Bombay, https://onlinecourses.nptel.ac.in/noc25_cs45/preview

**Evaluation Scheme:**

**Semester End Examination (A):**

**Theory:**

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

**Laboratory:**

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B)**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ Case study of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

**Laboratory: (Term work)**

Term work shall consist of minimum 10 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks

ii. Mini Project: 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

| Prepared by | Checked by | Head of the Department | Vice Principal | Principal |
|---|---|---|---|---|

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Edge and Fog Computing | | | | | | | | | | Course Code: DJS22ICC8013 | |
| Course Laboratory: Edge and Fog Computing Laboratory | | | | | | | | | | Course Code: DJS22ICL8013 | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 |
| | | | | Term Work | | | Laboratory Examination | | | | |
| 3 | 2 | -- | 4 | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | Oral & Practical | | 50 |
| | | | | 15 | 10 | 25 | 25 | – | – | | |

**Prerequisite**: Basic concepts of Cloud Computing and virtualization.

**Objectives:** The objective of the course is

1. Understand the fundamentals of distributed systems and edge computing and its role in IoT systems.
2. Analyze and compare different edge computing architectures, platforms and frameworks.
3. Assess and interpret data processing and analytical operations performed at the network edge.
4. Identify and describe the fundamental principles and framework models of fog computing.
5. Demonstrate effective communication and collaboration skills in developing edge computing projects.

**Outcomes**: On completion of the course, learner will be able to:

1. Understand the basic concepts of Edge Computing and its collaboration with Cloud Computing.
2. Demonstrate an understanding of edge computing architectures, platforms, and frameworks, along with the principles of virtualization and containerization.
3. Apply data processing capabilities along with edge analytics and caching to process and extract insights from data at the edge.
4. Comprehend the fundamentals and architectural design of fog computing.
5. Design and implement programming solutions for fog computing–based applications and frameworks.
6. Develop edge computing solutions for specific IoT use cases or scenarios.

| Detailed Syllabus: (unit wise) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Introduction to Distributed Systems:**<br>Characterization of Distributed Systems: Issues, Goals, and Types of distributed systems, Distributed System Models, Hardware concepts, Software Concept. Middleware: Models of Middleware, Services offered by middleware, Client Server model.<br>**Introduction to Edge Computing and IoT**<br>Understanding Edge Computing: Evolution, Use cases, advantages, disadvantages, Overview of edge computing and its significance in IoT, Challenges and opportunities in edge computing. Edge devices and their capabilities. | 09 |
| 2 | **Edge Computing Infrastructure**<br>Edge computing architectures and components: Requirements and views for Edge architecture, Edge Computing Reference Architecture, critical elements for Edge architecture, Challenges for Edge application Development. Setting up Edge computing environments: development tools, python libraries. Edge computing platforms and frameworks: AWS IoT Greengrass, Azure IoT Edge, Google Cloud IoT Edge, IBM Edge Application Manager, KubeEdge. Virtualization and containerization for edge computing: Introduction to Virtualization and containerization. Advantages of Virtualization and Containerization in Edge Computing. Resource Efficiency, Faster Time to Market. | 09 |
| 3 | **Data Processing at the Edge**<br>Data Acquisition and Processing: Data handling, python data handling, data storage and cloud connectivity, Data Aggregation, Data Timestamping and Synchronization, Data Security and Privacy. Edge analytics and machine learning at the edge: Introduction to Edge Analytics. Edge Machine Learning. Model Selection and Optimization. Collaborative Edge Learning. Resource management and task offloading strategies: Task Offloading, Edge- Cloud Collaboration, Dynamic Resource Provisioning. Edge caching and data synchronization: Introduction to Edge caching and data synchronization, Benefits of Edge Caching and Data Synchronization, Challenges in Edge Caching and Data Synchronization. | 07 |
| 4 | **Introduction to Fog Computing**<br>Definition and basic concepts, Comparison with cloud computing and IoT, Data Management in Fog Computing. Comparison with cloud computing and edge computing.<br>Fog Computing Architecture. Fog node and infrastructure components. Hierarchical and distributed models. Programming Models and Tools for Fog Computing. Applications and integration of Fog Computing. | 06 |

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| | | |
|---|---|---|
| 5 | **Fog computing programming languages and frameworks** Middleware and software platforms. Development and deployment considerations. Industrial Internet of Things (IIoT). Performance Evaluation and Metrics in Fog Computing. Simulation and modelling techniques. Applications and Use Cases of Fog Computing. Development environments and Frameworks for programming in Fog Computing. | 07 |
| 6 | **Applications and Case Studies** High-Potential Use cases, Edge computing for smart cities. Industrial IoT and edge computing. Edge computing in Healthcare. Industrial (IIoT) Predictive Maintenance: Machines equipped with sensors send data to fog nodes for real-time analysis, predicting failures before they occur. Process Automation: Manufacturing systems use fog computing to make split-second decisions on the factory floor. | 04 |
| | **Total** | **42** |

| **List of Laboratory Experiments:** (Minimum any eight experiments) | |
|---|---|
| **Sr. No.** | **Suggested Experiments** |
| 1 | Create and deploy virtual servers on AWS / Azure. |
| 2 | To deploy Raspberry Pi on AWS IoT Core |
| 3 | To implement MQTT messaging between the Raspberry Pi and AWS IoT Core |
| 4 | To implement virtual private cloud (VPC) on AWS for IoT services. |
| 5 | To implement YAFS (Yet Another Fog Simulator) with application |
| 6 | Design and deploy an edge computing architecture using edge simulators such as Mobius / EdgeCloudSim. |
| 7 | Develop and evaluate edge-based data analytics algorithms based on iFogSim simulator. |
| 8 | Design and deploy a fog computing architecture using simulators such as iFogSim/CloudSim. |
| 9 | Explore collaboration between edge and fog nodes for IoT applications by using simulator such as iFogSim or YAFS. |
| 10 | Compare response times and reliability of smart devices controlled via edge vs. cloud. Based on YAFS (Python). |
| 11 | Use edge devices to analyze machine data and predict failures before they occur. |

| | |
|---|---|
| 12 | Deploy wearable sensors and edge nodes to monitor vital signs and trigger alerts for anomalies. |
| 13 | Implement dynamic scheduling algorithms and measure energy consumption across fog nodes. |
| 14 | Test encryption protocols and evaluate performance trade-offs in fog-based IoT environments. |
| 15 | Simulate emergency scenarios and evaluate fog-based communication and decision-making systems. |

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

**Books Recommended:**

**Text Books:**

1. Buyya, R., & Srirama, S. N. "Fog and edge computing: Principles and paradigms" Wiley. ISBN: 978-1-119-52498-4,2019
2. Chiang, M., Balasubramanian, B., & Poor, H. V. "Edge computing: Models, technologies, and applications", Institution of Engineering and Technology (IET).. ISBN: 978-1-78561-940-3,2020
3. Bhadauria, A. "Edge computing with Python: End-to-end edge applications, Python tools and techniques, edge architectures, and AI benefit", BPB Publications. ISBN: 978-9355512000,2022
4. Singh, A. "Edge computing: Simply in depth" ISBN: 978-1091335295,2019
5. Kumari, K. A., Sadasivam, G. S., Dharani, D., & Niranjanamurthy, M. "Edge computing: Fundamentals, advances and applications", CRC Press. ISBN: 978-1032850665,2022

**Reference Books:**

1. Bhargava, B., Misra, S., Balas, V. E., & Kumar, R., "Edge computing for IoT: Architectures and applications", IntechOpen., ISBN: 978-0-85466-770-3,2024
2. Bhattacharjee, S., & Chowdhury, R, "Practical industrial Internet of Things security: A practitioner's guide to securing connected industries" Packt Publishing. ISBN: 978-1788832687,2021

3. Chitturi, K., Veeravalli, B., & Srirama, S. N. "Edge computing: An introduction to the next generation of networked systems. Wiley-IEEE Press.ISBN: 978-1394285839,2025
4. Guinard, D., & Trifa, V. M. "Building the Web of Things: With examples in Node.js and Raspberry Pi", Manning Publications. ISBN: 978-1617292682,2018
5. Balamuralidhar, P., Veeravalli, B., & Raghu, V. (Eds.). "Internet of Things (IoT): Technologies, applications, challenges, and solutions", CRC Press. ISBN: 978-0367572921,2020

**Web resources:**

1. Introduction to Edge Computing and IoT- https://www.amrita.edu/course/fog-and-edge-computing/
2. Edge Computing Infrastructure- https://dsuniversity.ac.in/pdf/SET_Department/Fog_and_Edge_Computing.pdf.
3. Data Processing at the Edge- https://www.acg.edu/dereeacg/files/pdfs/ITC3338.pdf
4. Introduction to Fog Computing- https://manoov.github.io/courses/_bcse313l-fundamentals-of-fog-and-edge-computing/
5. Fog computing programming languages and frameworks- https://www.amrita.edu/course/fog-and-edge-computing/
6. Applications and Case Studies- https://fiveable.me/iot-systems/unit-5/edge-computing-fog-computing/study-guide/BFA2Dnx1tHmnBXX0

**Online Courses: NPTEL / Swayam**

1. Edge Computing By Prof. Rajiv Misra IIT Patna https://onlinecourses.nptel.ac.in/noc25_cs28/preview
2. Edge Computing Infrastructure By Rajiv Misra IIT Kanpur https://nptel.ac.in/courses/106104449
3. Foundation of Cloud IoT Edge ML By Prof. Rajiv Misra IIT Patna https://onlinecourses.nptel.ac.in/noc23_cs65/preview
4. Artificial Intelligence and Edge Computing Prof. C Chandra Shekar, IIT Madras https://iitmpravartak.emeritus.org/iitmp-applied-aiml-tech-certificate-programme?
5. Introduction to Industry 4.0 & IIoT (with Fog computing part) By Prof. Sudip Misra IIT Kharagpur https://onlinecourses.nptel.ac.in/noc25_cs43/preview?utm_source=chatgpt.com

Thellolar

**Evaluation Scheme:**

**Semester End Examination (A):**

**Theory:**

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

**Laboratory:**

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions

**Continuous Assessment (B):**

**Theory:**

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

**Laboratory: (Term work)**

Term work shall consist of minimum 8 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 10 Marks
ii. Assignments (Quiz, Descriptive/Analytical Questions): 5 marks
iii. Miniproject (Implementation, Report): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | | | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Project Management | | | | | | | | | | Course Code: DJS22ILO8021 | | | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | | Term Test 2 | | Total | | |
| | | | | 65 | | | 20 | | 15 | | 35 | | 100 |
| | | | | Term Work | | | Laboratory Examination | | | | | | |
| 3 | – | -- | 3 | Laboratory Work | Tutorial/ Mini project / presentation/ Journal/ Practical | Total Term work | Oral | | Practical | | Oral & Practical | | – |
| | | | | – | – | -- | – | | – | | – | | |

**Pre-requisites:**

Basic concepts of Management

**Course Objectives:**

1. To familiarize the students with the use of a structured methodology/approach for every unique project undertaken, utilizing project management concepts, tools and techniques.
2. To appraise the students with the project management life cycle and make them knowledgeable about the various phases from project initiation through closure.

**Course Outcomes:** On completion of this course, learners will be able to

1. Explain project management life cycle and the various project phases as well as the role of project manager.
2. Apply selection criteria and select an appropriate project from different options.
3. Create a work breakdown structure for a project and develop a schedule based on it. Manage project risk strategically.
4. Use Earned value technique and determine & predict status of the project.
5. Capture lessons learned during project phases and document them for future reference.

| Project Management (DJS22ILO8021) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Project Management Foundation:** Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical & atypical), Project phases and stage gate process. Role of project manager, Negotiations and resolving conflicts, Introduction to project leadership, ethics in projects, Multicultural and virtual projects, Project management in various organizational structures, PM knowledge areas as per the Project Management Institute (PMI). | 08 |
| 2 | **Initiating Projects:** How to get a project started, selecting a project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating a charter, Effective project team, Stages of team development & growth (forming, storming, norming & performing), team dynamics. | 08 |
| 3 | **Project Planning:** Work Breakdown Structure (WBS) and linear responsibility chart, Project cost estimation and budgeting, top-down and bottom-up budgeting. Networking and Scheduling techniques, PERT, CPM, Crashing project time, Resource loading and levelling, Goldratt's critical chain, GANTT chart, Project Stakeholders and Communication plan, Introduction to Project Management Information System (PMIS). Risk Management in projects: Risk management planning, Risk identification and risk register, Qualitative and quantitative risk assessment, Probability and impact matrix. Risk response strategies for positive and negative risks. | 10 |
| 4 | **Monitoring and Controlling Projects:** Planning, monitoring, and controlling cycle, Information needs and reporting, engaging all stakeholders of the projects, communication, and project meetings. With Earned Value Management techniques for measuring the value of work completed, using milestones for measurement, change requests, and scope creep, Project audit. Project Contracting Project procurement management, contracting and outsourcing. | 08 |
| 5 | **Closing the Project:** Customer acceptance, Reasons of project termination, Various types of project terminations (Extinction, Addition, Integration, Starvation), Process of project termination, completing a final report, doing a lessons learned analysis, acknowledging successes and failures. | 08 |
| | **Total** | 42 |

**Books Recommended:**

**Text books:**

1. Project Management: A managerial approach, Jack Meredith & Samuel Mantel, 7th Edition, Wiley India.

2. Project Management: The Managerial Process, 6th edition, Erik Larson, Clifford Gray, McGraw Hill Education.

Ghellokar

**Reference Books:**

1. A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 5th Ed. Project Management Institute PA, USA.

2. Project Management, Gido Clements, Cengage Learning.

3. Project Management, Gopalan, Wiley India.

4. Project Management, Dennis Lock, 9th Edition, Gower Publishing England.

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Entrepreneurship Development and Management | | | | | | | | | | Course Code: DJS22ILO8022 | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 |
| | | | | Term Work | | | Laboratory Examination | | | | |
| 3 | – | -- | 3 | Laboratory Work | Tutorial/ Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | Oral & Practical | | – |
| | | | | – | – | -- | – | – | – | | |

**Course Objectives:**

1. To develop entrepreneurial abilities by providing background information about support systems, skill sets, financial and risk covering institutions.
2. To appraise the students with the fundamentals that can help them to make right decisions for

**Course Outcomes:** On completion of this course, learner will be able to

1. Develop idea generation, creative and innovative skills
2. Prepare a Business Plan
3. Compare different entrepreneur supporting institutions
4. Correlate suitable MSME scheme for an entrepreneur
5. Interpret financial and legal aspect of a business.

| Entrepreneurship Development and Management (DJS22ILO8022) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Meaning of Entrepreneur**<br>Evolution of the concept, Functions of an Entrepreneur, Types of Entrepreneurs, Intrapreneur- an emerging class, Concept of Entrepreneurship, Evolution of Entrepreneurship Development of Entrepreneurship Entrepreneurial, Culture Stages in the entrepreneurial process: Develop idea generation, creative, and innovative skills | **08** |
| 2 | **Business Planning Process**<br>Meaning of business plan, Business plan process, Advantages of business planning Marketing plan, Production/operations plan, Organization plan, Financial plan, Final Project Report with Feasibility Study, Preparing a model project report for starting a new venture. | **08** |
| 3 | **Institutions Supporting Entrepreneurs:**<br>Small industry financing in developing countries, A brief overview of financial institutions in India, Central level and state level institutions - SIDBI-NABARD-IDBI-SIDCO, Indian Institute of Entrepreneurship System. District Industries Centers - Single Window | **08** |
| 4 | **Micro, Small, and Medium Enterprises (MSMES):**<br>MSMEs - Definition and Significance in Indian Economy; MSME Schemes, Challenges and Difficulties in availing MSME Schemes, Forms of Business; Make-In India, Start-Up India, Stand-Up India. Women Entrepreneurship; Rural Entrepreneurship; Family Business and First-Generation Entrepreneurs | **09** |
| 5 | **Finance, Accounting, Costing, and Legal Aspects of Business:**<br>Funding new ventures: Conventional Source of Finance, bootstrapping, crowd sourcing- angel investors, VCs, debt financing, due diligence, Legal aspects of business (IPR, GST, Labour law)- Cost, volume, profit, and break-even analysis - Margin of safety and the degree of operating leverage. Capital budgeting for comparing projects or opportunities, Product costing- Product pricing- Introduction to financial statements - Profit & Loss statement, Balance sheet - Cash flow-Closure of Business | **09** |
| | **Total** | **42** |

**Books Recommended:**

**Reference Books:**

1. Effective Entrepreneurial Management: Strategy, Planning, Risk Management, and Organization - by Robert D. Hisrich Veland Ramadani, Springer Publication (2017)
2. Entrepreneurship-Theory, Process Practice -by Donald F.Kuratko, Cengage Learning(2014)
3. Entrepreneurship 6/E-by Robert D. Hisrich McGraw-Hill Education (India) (2011)
4. Entrepreneurship and small business- by Burns, P. New Jersey: Palgrave. (2001).
5. Innovation and entrepreneurship by Drucker. F. Peter, Harper business, (2006).
6. Entrepreneurship development small business enterprises, Poornima M Charantimath Pearson Publication (2013)
7. Entrepreneurial Development -Jayshree Suresh, Margham Publishers, Chennai
8. The Design of Business- by Martin Roger, Harvard Business Publishing (2009)
9. Entrepreneurship-by Roy Rajiv Oxford University Press (2011)

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | | | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Corporate Social Responsibility | | | | | | | | | | Course Code: DJS22ILO8023 | | | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | | Term Test 2 | | Total | | |
| | | | | 65 | | | 20 | | 15 | | 35 | | 100 |
| | | | | Term Work | | | Laboratory Examination | | | | | | |
| 3 | – | -- | 3 | Laboratory Work | Tutorial/ Mini project / presentation/ Journal/ Practical | Total Term work | Oral | | Practical | | Oral & Practical | | – |
| | | | | – | – | -- | – | | – | | – | | |

**Course Objectives:**

1. To acquaint learners with the concept, theories, and application of CSR for the development of society
2. To impart an understanding of the international framework and legislations of CSR
3. To identify stakeholders and drivers of CSR

**Course Outcomes:** On completion of this course, learner will be able to

1. Describe the fundamental concepts of Corporate Social Responsibility (CSR)
2. Recognize the international framework for CSR to enable business decision-making which is informed by human values.
3. Explain CSR Legislation in India and the world
4. Relate the drivers of CSR in India
5. Identify the key stakeholders of CSR

| Corporate Social Responsibility (DJS22ILO8023) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Introduction to CSR**<br>Meaning and Definition, History of CSR, Concepts of Charity, Corporate Philanthropy, Corporate Citizenship, Sustainability, and Stakeholder Management. Environmental aspects of CSR, Chronological evolution, and Models of CSR in India, including Carroll's model and major codes on CSR Initiatives in India. | 09 |
| 2 | **International Framework for Corporate Social Responsibility**<br>Millennium Development Goals, Sustainable Development Goals, Relationship between CSR and MDGs. United Nations (UN) Global Compact 2011. UN guiding principles on business and human rights. OECD CSR policy tool, ILO Tripartite Declaration of Principles on Multinational Enterprises and Social Policy. | 09 |
| 3 | **CSR-Legislation in India and the World**<br>Section 135 of the Companies Act 2013.Scope for CSR Activities under Schedule VII,<br>Appointment of Independent Directors on the Board, and the Implementation of the Computation of Net Profit in India. | 08 |
| 4 | **The Drivers of CSR in India**<br>Market-based pressure and incentives, civil society pressure, the regulatory environment in India, Counter trends, Review of current trends and opportunities in CSR, Review of<br>successful corporate initiatives, and challenges of CSR. Case Studies of Major CSR Initiatives, Corporate Social Responsibility and Public-Private Partnership (PPP). | 08 |
| 5 | **Identifying key stakeholders of CSR**<br>Role of Public Sector in Corporate, government programs, Nonprofit, and Local Self<br>Governance in implementing CSR, Global Compact Self-Assessment Tool, National Voluntary Guidelines by the Govt. of India, and Roles and responsibilities of corporate foundations. | 08 |
| | **Total** | **42** |

**Books Recommended:**

**Text books:**

1. Corporate Social Responsibility in India, Sanjay K Agarwal, Sage Publications, 2008

2. Corporate Social Responsibility in India, Bidyut Chakrabarty, Routledge, New Delhi, 2015.

**Reference Books:**

1. Corporate Social Responsibility: An Ethical Approach, Mark S. Schwartz, Broadview Press, 2011
2. Attaining Sustainable Growth through Corporate Social Responsibility, George Pohle and Jeff
3. Hittner, IBA Global Business Services, 2008
4. Strategic Corporate Social Responsibility: Stakeholders in a Global Environment, William B.
5. Werther Jr. and David Chandler, 2nd Edition, Sage Publications, 2011

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**Web resources:**

1. https://pitt.libguides.com/csr/websites
2. https://study.sagepub.com/sites/default/files/carroll.pdf
3. https://study.sagepub.com/sites/default/files/orlitzkysiegelwaldman.pdf

**Online Courses: NPTEL / Swayam**

1. History, planning, implementation, evaluation, and development of the CSR cycle in profit making organizations. https://youtu.be/CpB5TehNia8?si=HPHgtIxMOuvoxHQ-
2. Evolution, theories, stakeholders, Corporate Governance and Citizenship https://youtu.be/VM_E0RRUe9I?si=JlcMuOasEqD7br4C

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Human Resource Management | | | | | | | | | | Course Code: DJS22ILO8024 | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 |
| | | | | Term Work | | | Laboratory Examination | | | | |
| 3 | – | -- | 3 | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | Oral & Practical | | – |
| | | | | – | – | -- | – | – | – | | |

**Course Objectives:**

1. To introduce the students with basic concepts, techniques and practices of the human resource management.
2. To provide opportunity of learning Human resource management (HRM) processes, related with the functions, and challenges in the emerging perspective of today's organizations.
3. To familiarize the students about the latest developments, trends & different aspects of HRM.
4. To acquaint the student with the importance of inter-personal & inter-group behavioral skills in an organizational setting required for future stable engineers, leaders and managers.

**Course Outcomes:** On completion of this course, learner will be able to

1. Understand the key concepts, aspects, techniques and practices of the human resource management.
2. Apply Principles of Organizational Behavior to analyze the impact of personality, perception, and motivation on individual behavior and decision-making within organizations.
3. Evaluate Group Dynamics and Team Effectiveness
4. Analyze Strategic HRM and Organizational Structure
5. Demonstrate knowledge of basic labor laws and current trends in HRM, including diversity management and the role of technology in shaping the future of work.

| Human Resource Management (DJS22ILO8024) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Introduction to HR**<br>Human Resource Management- Concept, Scope, and Importance, Interdisciplinary Approach Relationship with other Sciences, Competencies of HR Manager, HRM functions. Human resource development (HRD): changing role of HRM, Human resource Planning, Technological change, Restructuring, and rightsizing. Empowerment, TQM, and Managing ethical issues. | 08 |
| 2 | **Organizational Behaviour (OB)**<br>Introduction to OB Origin, Nature and Scope of Organizational Behaviour, Relevance to Organizational Effectiveness and Contemporary Issues.<br>Personality: Meaning and Determinants of Personality, Personality development, Personality Types, Assessment of Personality Traits for Increasing Self Awareness.<br>Perception: Attitude and Value, Effect of perception on Individual Decision-making. Attitude and Behaviour.<br>Motivation: Theories of Motivation and their Applications for Behavioural Change (Maslow, Herzberg, McGregor);<br>Group Behaviour and Group Dynamics: Work groups, formal and informal groups and stages of group development, Team Effectiveness: High performing teams, Team Roles, cross functional and self-directed team.Case study. | 10 |
| 3 | **Organizational Structure & Design**<br>Structure, size, technology, Environment of organization; Organizational Roles & conflicts: Concept of roles; role dynamics; role conflicts and stress.<br>Leadership: Concepts and skills of leadership, Leadership and managerial roles, Leadership styles and contemporary issues in leadership.<br>Power and Politics: Sources and uses of power, Politics at the workplace, Tactics and strategies. | 08 |
| 4 | **Human Resource Planning**<br>Recruitment and Selection process, Job-enrichment, Empowerment-Job Satisfaction, employee morale.<br>Performance Appraisal Systems: Traditional & modern methods, Performance Counselling. Career Planning.<br>Training & Development: Identification of Training Needs, Training Methods. Strategic HRM: Role of Strategic HRM in the modern business world, Concept of Strategy, Strategic Management Process, Approaches to Strategic Decision Making:Strategic Intent-Corporate Mission, Vision, Objectives, and Goals. | 08 |
| 5 | **Labor Laws and Industrial Relations:**<br>Evolution of IR, IR issues in organizations, Overview of Labor Laws in India; Industrial Disputes Act, Trade Unions Act, Shops and Establishments Act.<br>**Emerging Trends in HR**<br>Organizational development; Business Process Re-engineering (BPR), BPR as a tool for organizational development, managing processes & transformation in HR.<br>Organizational Change, Culture, Environment.<br>Cross-Cultural Leadership and Decision Making: Cross-Cultural Communication and diversity at work, Causes of diversity, managing diversity with special reference to handicapped, women, and ageing people, intra-company cultural differences among employees motivation. | 08 |
| | **Total** | 42 |

**Books Recommended:**

**Reference Books:**

1. Stephen Robbins, Organizational Behavior, 16th Ed, 2013
2. V SP Rao, Human Resource Management, 3rd Ed, 2010, Excel publishing
3. Aswathapa, Human Resource Management: Text & Cases, 6th edition,
4. C. B. Mamoria and SV Gankar, Dynamics of Industrial Relations in India, 15th Ed, 2015, Himalaya Publishing, 15thedition, 2015
5. P. Subba Rao, Essentials of Human Resource management and Industrial relations, 5th Ed, 2013, Himalaya Publishing
6. Laurie Mullins, Management & Organizational Behavior, Latest Ed, 2016, Pearson Publications

**Web Resources:**

1. Case studies and best practices in HRM: https://www.shrm.org/
2. Strategic HRM and HR practices: https://www.hr.com/en?t=/
3. Handbook of HRM: https://hrmhandbook.com/

**Online Courses: NPTEL/SWAYAM/Courses**

1. Human Resource Development by Prof. KBL Srivastava from IIT Kharagpur https://onlinecourses.nptel.ac.in/noc20_hs48/preview
2. **Management of Human Resources** by Dr. Nayantara Padhi from IGNOU https://onlinecourses.swayam2.ac.in/nou20_mg02/preview

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Corporate Finance Management | | | | | | | | | | Course Code: DJS22ILO8025 | | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | Total marks (A+B) | |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | | Total | | |
| | | | | 65 | | | 20 | 15 | | 35 | 100 | |
| | | | | Term Work | | | Laboratory Examination | | | | | |
| 3 | – | -- | 3 | Laboratory Work | Tutorial/ Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | | Oral & Practical | – | |
| | | | | – | – | -- | – | – | | – | | |

**Pre-requisites:**

1. Basic Knowledge of Algebra
2. Probability and Statistics.

**Course Objectives:**

1. Overview of Indian financial system, instruments and market.
2. Basic concepts of value of money, returns and risks, corporate finance, working capital and its management.
1. Knowledge about sources of finance, capital structure, dividend policy.

**Course Outcomes:** On completion of this course, learner will be able to

1. Understand Indian finance system.
2. Apply concepts of time value money and risk returns to product, services and business.
3. Understand corporate finance; evaluate and compare performance of multiple firms.
4. Take Investment, finance as well as dividend decisions.

| Corporate Finance Management (DJS22ILO8025) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Overview of the Indian Financial System:** Characteristics, Components, and Functions of the Financial System. Financial Instruments: Meaning, Characteristics, and Classification of Basic Financial Instruments: Equity Shares, Preference Shares, Bonds-Debentures, Certificates of Deposit, and Treasury Bills. Financial Markets: Meaning, Characteristics and Classification of Financial Markets - Capital Market, Money Market, and Foreign Currency Market Financial Institutions: Meaning, Characteristics, and Classification of Financial Institutions-Commercial Banks, Investment-Merchant Banks, and Stock Exchanges | **08** |
| 2 | **Overview of Corporate Finance:** Objectives of Corporate Finance; Functions of Corporate Finance Investment Decision, Financing Decision, and Dividend Decision. Financial Ratio Analysis.<br>**Overview of Financial Statements:** Balance Sheet, Profit and Loss Account, and Cash Flow Statement; Purpose of Financial Ratio Analysis; Liquidity Ratios; Efficiency or Activity Ratios; Profitability Ratios; Capital Structure Ratios: Stock Market Ratios; Limitations of Ratio Analysis | **08** |
| 3 | **Concepts of Returns and Risks:** Measurement of Historical Returns and Expected Returns of a Single Security and a Two-Security Portfolio; Measurement of Historical Risk and Expected Risk of a Single Security and a Two-Security Portfolio.<br>Time Value of Money: Future Value of a Lump Sum, Ordinary Annuity, and Annuity Due: Present Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Continuous Compounding and Continuous Discounting. | **08** |
| 4 | **Working Capital Management:** Concepts of Meaning Working Capital; Importance of Working Capital Management; Factors Affecting an Entity's Working Capital Needs; Estimation of Working Capital Requirements; Management of Inventories; Management of Receivables; and Management of Cash and Marketable Securities.<br>Capital Budgeting: Meaning and Importance of Capital Budgeting; Inputs for Capital Budgeting Decisions; Investment Appraisal Criterion-Accounting Rate of Return, Payback Period, Discounted Payback Period, Net Present Value(NPV), Profitability Index, Internal Rate of Return (IRR), and Modified Internal Rate of Return (MIRR). | **09** |
| 5 | **Capital Structure:** Factors Affecting an Entity's Capital Structure; Overview of Capital Structure Theories and Approaches Net Income Approach, Net Operating Income Approach; Traditional Approach, and Modigliani-Miller Approach. Relation between Capital Structure and Corporate Value; Concept of Optimal Capital Structure Dividend Policy: Meaning and Importance of Dividend Policy; Factors Affecting an Entity's Dividend Decision; Overview of Dividend Policy Theories and Approaches-Gordon's Approach, Walter's Approach, and Modigliani-Miller Approach | **09** |
| | **Total** | **42** |

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**Books Recommended:**

**Reference Books:**

1. Fundamentals of Financial Management, 13th Edition (2015) by Eugene F. Brigham and Joel F. Houston; Publisher: Cengage Publications, New Delhi.
2. Analysis for Financial Management, 10th Edition (2013) by Robert C. Higgins; Publishers: McGraw Hill Education, New Delhi.
3. Indian Financial System, 9th Edition (2015) by M. Y. Khan; Publisher: McGraw Hill Education, New Delhi.
4. Financial Management, 11th Edition (2015) by 1. M. Pandey; Publisher: S. Chand (G/L) & Company Limited, New Delhi.
5. Financial Management, Theory & Practice 8th Edition (2011), by Prasanna Chandra: Tata McGraw Hill Education Private Limited, New Delhi.

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

Shri Vile Parle Kelavani Mandal's

# DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

(Autonomous College Affiliated to the University of Mumbai)

NAAC Accredited with "A" Grade (CGPA : 3.18)

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | | Final Year B.Tech | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Logistic and Supply Chain Management | | | | | | | | | | | Course Code: DJS22ILO8026 | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | Total marks (A+B) | |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 | |
| | | | | Term Work | | | Laboratory Examination | | | | | |
| 3 | – | – | 3 | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | Oral & Practical | | – | |
| | | | | – | – | – | – | – | – | | | |

**Course Objectives:**

1. To acquaint with the concept of key drivers of supply chain performance and their inter-relationships with strategy.
2. To acquaint with the design problems and develop an understanding of information technology in supply chain optimization.
3. To acquaint with the complexity of inter-firm and intra-firm coordination in implementing programs such as e-collaboration, quick response, jointly managed inventories and strategic alliances.

**Course Outcomes:** On completion of this course, learner will be able to:

1. Demonstrate the functional strategy map of supply chain management.
2. Analyze the determinants of Supply Chain and Transportation networks design.
3. Demonstrate the need of coordination and sourcing decisions in supply chain.
4. Understand pricing, revenue management and role of IT in supply chain.
5. Gain knowledge of various sustainability aspects of a supply chain.

| Logistic and Supply Chain Management (DJS22ILO8026) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Understanding the Supply Chain:** Objective, Importance, Decision Phases, Process Views. **Achieving Strategic Fit and Scope:** Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope, Challenges to Achieving and Maintaining Strategic Fit. **Supply Chain Drivers and Metrics:** Financial Measures of Performance, Drivers of Supply Chain Performance, Framework for Structuring Drivers, Facilities, Inventory, Transportation, Information, Sourcing, Pricing. **Creating the Responsive Supply Chain:** Product push versus demand pull, The Japanese philosophy, The foundations of agility, A route-map to responsiveness. | 08 |
| 2 | **Designing the Supply Chain and Transportation Networks** **Designing Distribution Networks:** The Role of Distribution in the Supply Chain, Factors Influencing Distribution Network Design, Design Options for a Distribution Network. **Network Design in the Supply Chain:** The Role of Network Design in the Supply Chain, Factors Influencing Network Design Decisions, Framework for Network Design Decisions, Models for Facility Location and Capacity Allocation. **Designing Global Supply Chain Networks:** The Impact of Globalization on Supply Chain Networks, The Offshoring Decision: Total Cost, Risk Management in Global Supply Chains, Discounted Cash Flows, Evaluating Network Design Decisions Using Decision Trees. **Transportation in a Supply Chain:** The Role of Transportation in a Supply Chain, Modes of Transportation and their Performance Characteristics, Design Options for a Transportation Network, Trade-Offs in Transportation Design, Tailored Transportation. | 10 |
| 3 | **Coordination in a Supply Chain:** Lack of Supply Chain Coordination and the Bullwhip Effect, The Effect on Performance of Lack of Coordination, Obstacles to Coordination in a Supply Chain, Managerial Levers to Achieve Coordination, Continuous Replenishment and Vendor-Managed Inventories, Collaborative Planning, Forecasting, and Replenishment. **Sourcing Decisions in a Supply Chain:** The Role of Sourcing in a Supply Chain, In-House or Outsource, Third- and Fourth-Party Logistics Providers, Using Total Cost to Score and Assess Suppliers, Supplier Selection-Auctions and Negotiations, Contracts, Risk Sharing and Supply Chain Performance, Design Collaboration, The Procurement Process. | 08 |
| 4 | **Pricing and Revenue Management in a Supply Chain:** The Role of Pricing and Revenue Management in a Supply Chain, Pricing and Revenue Management for Multiple Customer Segments, Pricing and Revenue Management for Perishable Assets, Pricing and Revenue Management for Seasonal Demand, Pricing and Revenue Management for Bulk and Spot Contracts. **Information Technology in a Supply Chain:** The Role of IT in a Supply Chain, The | 08 |

| | | |
|---|---|---|
| | Supply Chain IT Framework, Customer Relationship Management, Internal Supply Chain Management, Supplier Relationship Management, The Transaction Management Foundation, Managing the supply chain as a network, Seven major business transformations, From 3PL to 4PL. The Future of IT in the Supply Chain. | |
| 5 | **Creating a Sustainable Supply Chain:** The Role of Triple Bottom Line, Key Metrics for Sustainability, Greenhouse gases and the supply chain, Reducing the transport-intensity of supply chains, Beyond the carbon footprint, Reduce, reuse, recycle, Sustainability and Supply Chain Drivers. **Introduction to the Supply Chain of the Future:** Emerging Megatrends. | **08** |
| | **Total** | **42** |

**Books Recommended:**

**Reference Books:**

1. Logistics & Supply Chain Management, Martin Christopher, Pearson Education Limited, 2016.
2. Supply Chain Management Strategy, Planning, and Operation, Sunil Chopra and Peter Meindl, Pearson, 2016.
3. Essentials of Supply Chain Management, Michael H. Hugos, Wiley, 2018.
4. Supply Chain Management For Dummies, Daniel Stanton, Wiley, 2020.
5. Global Supply Chain and Operations Management A Decision-Oriented Introduction to the Creation of Value, Dmitry Ivanov, Alexander Tsipoulanidis and Jörn Schönberger, Springer International Publishing, 2016.
6. Supply Chain Management, Sinha, McGraw-Hill Education (India) Pvt Limited, 2012.

**Web Resources**

1. Supply chain case studies on cost reduction and management: https://www.logisticsbureau.com/7-mini-case-studies-successful-supply-chain-cost-reduction-and-management/
2. Detailed case study on Zara Clothing Company Supply chain: https://www.scmglobe.com/zara-clothing-company-supply-chain/
3. Latest research on supply chains from Harvard Business School on issues including supply chain management and digital supply chain: https://hbswk.hbs.edu/Pages/browse.aspx?HBSTopic=Supply%20Chain

**Online Courses: NPTEL/SWAYAM/Courses**

1. **Supply Chain Digitization** by Prof. Priyanka Verma, IIM Mumbai https://onlinecourses.nptel.ac.in/noc24_mg59/preview
2. **Supply Chain Analytics** by Prof. Rajat Agrawal, IIT Roorkee https://onlinecourses.nptel.ac.in/noc21_mg12/preview

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

Shri Vile Parle Kelavani Mandal's

**DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING**

(Autonomous College Affiliated to the University of Mumbai)

NAAC Accredited with "A" Grade (CGPA : 3.18)

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | Final Year B.Tech | | | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : IPR and Patenting | | | | | | | | | Course Code: DJS22ILO8027 | | | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | Total marks (A+B) | |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 | |
| | | | | Term Work | | | Laboratory Examination | | | | | |
| 3 | – | -- | 3 | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | Oral & Practical | | – | |
| | | | | – | – | – | – | – | – | | | |

**Objectives:**

1. Understanding, defining and differentiating different types of intellectual properties (IPs)
2. Assessing different IP management (IPM) approaches
3. Exposure to the Legal management of IP and understanding of real life practice of IPM.
4. Understanding post-grant processes related to Intellectual Property.

**Outcomes:** On completion of this course, learner will be able to

1. Recognize the crucial role of IP for the purposes of product and technology development.
2. Understand how and when to file a patent.
3. Apply the knowledge to understand the entire ecosystem.
4. Derive value from IP and leverage its value in new product and service development.
5. Identify appropriate Intellectual Property Right for a creation.

| IPR and Patenting (DJS22ILO8027) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Concept of Intellectual Property Law**<br>Idea/Expression dichotomy, Introduction, and the need for intellectual property rights (IPR), Intellectual Property laws, IPR in India: Genesis and development, IPR abroad, Major International Instruments concerning Intellectual Property Rights: Paris Convention, the Berne Convention, the Universal Copyright Convention, the WIPO Convention, the Patent Cooperation Treaty, the TRIPS Agreement, incentive theory, types of IPR, India's New National IP Policy, 2016, Govt. Schemes in IPR IP | 08 |
| 2 | **Patents and Trademarks**<br>Elements of Patentability: Novelty, Non-Obviousness, Industrial Application, Non Patentable Subject Matter, Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties, Patent Office and Appellate Board, Case study of existing patents related to software, healthcare, and devices<br>Concept of Trademarks, Different kinds of marks (brand names, logos, signatures, symbols, well-known marks, certification marks, and service marks), Non Registrable Trademarks, Registration of Trademarks, Rights of holder and assignment and licensing of marks, Infringement, Remedies & Penalties, Trademarks registry and appellate board | 10 |
| 3 | **Copyrights and Designs**<br>Copyrights: Nature, Subject matter: original literary, dramatic, musical, artistic works, cinematograph films and sound recordings, Registration Procedure, Term of protection,<br>Ownership of copyright, Assignment and licence of copyright, Infringement, Remedies<br>& Penalties, Related Rights, distinction between related rights and copyrights<br>Design: meaning and concept of novel and original, procedure for registration, effect of<br>registration and term of protection. | 08 |
| 4 | **GI, PVP, and LDP**<br>Geographical indication: meaning, difference between GI and trademarks, procedure for registration, effect of registration, and term of protection. Plant variety protection: meaning, benefit sharing, farmers' rights, procedure for registration, effect of registration, and term of protection. Layout Design protection: meaning, procedure for registration, effect of registration, term of protection | 08 |
| 5 | **Beyond IP**<br>Introduction to Competition Law: concept of competition, relationship and Interaction between IPR and competition law, IP and competition issues, Technology transfer agreements. EU experience with IP and Competition Law, the Indian Competition Act, and IPR protection, IPR issues in mergers and acquisitions, harmonization of IP protection, and competition Law in India. | 08 |
| | **Total** | 42 |

**Books Recommended:**

**Text books:**


1. Feroz Ali, The Law of Patents, LexisNexis.
2. Ronald D. Slusky, Invention Analysis and Claiming – A Patent Lawyer's Guide, Second Edition, American Bar Association, 2012.
3. Feroz Ali, The Touchstone Effect – The Impact of Pre-grant Opposition on Patents, LexisNexis, 2009.


**Reference Books:**


1. Innovation and entrepreneurship by Drucker. F. Peter, Harper business, (2006).
2. Intellectual Property Rights, Deborah. E. Bouchoux, Cengage Learning.
3. Intellectual Property Rights—Unleashmy The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,
4. The Design of Business by Martin Roger, Harvard Business Publishing (2009)


**Web resources:**

1. Maps of Intellectual Property - https://cyber.harvard.edu/people/tfisher/IP/IPMaps.htm
2. The Patents Act, 1970 - https://ipindia.gov.in/acts-patents.htm
3. The Trademarks Act, 1957 - https://ipindia.gov.in/acts-rules-tm.htm
4. The Designs Act, 2000 - https://ipindia.gov.in/acts-designs.htm

**Online Courses: NPTEL / Swayam**

1. Patent Drafting for Beginners, by Prof. Feroz Ali
   https://onlinecourses.nptel.ac.in/noc24_hs59/preview
2. Patent Law for Engineers and Scientists, by Prof. Feroz Ali
   https://onlinecourses.nptel.ac.in/noc24_hs155/preview
3. World Intellectual Property Organisation courses https://www.wipo.int/academy/en/

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Digital Marketing Management | | | | | | | | | | Course Code: DJS22ILO8028 | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 |
| | | | | Term Work | | | Laboratory Examination | | | | |
| 3 | – | -- | 3 | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | Oral & Practical | | – |
| | | | | – | – | – | – | – | – | | |

**Course Objectives:**

1. To explain the evolution of digital marketing and outline the underlying technology and frameworks within which digital marketing operates.
2. To understand digital marketing business models elucidating on the six core digital value elements and how they can be used to generate customer value.
3. To understand the key concepts of developing strategy for digital business and the emerging business structures.
4. To plan the digital marketing strategy roadmap, its four key stages and their elements and understand the 6S Digital Marketing Implementation Stages.
5. To understand digital marketing planning & operations setup.
6. To explain the implementation of search campaigns which include Search Engine Marketing (SEM) and Search Engine Optimization (SEO) concepts.
7. To explain upcoming digital marketing concepts including Big Data and Internet of Things (IoT), Small and Medium Businesses (SMB), B2B marketing and Social, Local and Mobile (SoLoMo) concept.

**Course Outcomes:** On completion of this course, learner will be able to

1. Understand the digital marketing framework & model and consumer behaviour.
2. Develop digital marketing strategy roadmap.
3. Explain the terminology and concepts for developing web-specific media plans.
4. Understand concepts related to digital campaign management and revenue generation models.
5. Get a perspective on global digital marketing technology/tools and future trends.

| Digital Marketing Management (DJS22ILO8028) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Introduction to Digital Marketing**<br>Emergence of Digital Marketing as a tool, media consumption drivers for a new marketing environment, applications, and benefits of digital marketing.<br>**Digital Marketing Framework:** Delivering enhanced customer value, market opportunity analysis, and digital services development, ASCOR framework, and critical success factors for digital marketing.<br>**Digital Marketing Models Creation:** Factors impacting the digital marketplace, value chain digitization, and business models.<br>**The Consumer for Digital Marketing:** Consumer behavior on the internet, evolution of consumer behavior models, managing consumer demand, integrated marketing communications (IMC), and impact of digital channels on IMC. | 08 |
| 2 | **Digital Marketing Strategy Development**<br>Elements of the assessment phase, macro-micro environmental analysis, and marketing situation analysis.<br>**Digital Marketing Internal Assessment and Objectives Planning:** Analyzing the present offerings mix, marketing mix, core competencies analysis, and internal resource mapping. Digital presence analysis, digital marketing objectives development, and review.<br>**Digital Marketing Strategy Definition**<br>Understanding digital business strategy and structures, consumer development strategy, offering mix for Digital, digital pricing models, managing promotional channels, and developing the extended Ps- People, process, programs, and performance.<br>**Digital Marketing Strategy Roadmap:** Developing a digital marketing strategy roadmap, the 6s digital marketing implementation strategy, and marketing across the product life cycle. | 10 |
| 3 | **Digital Marketing Planning and Setup**<br>Understanding digital media planning terminology and stages, steps to creating a marketing communications strategy, introduction to search marketing, display marketing, and social media marketing.<br>**Digital Marketing Operations Setup:** Basics of lead generation and conversion marketing, website content development and management, elements of user experience, web usability, and evaluation. | 08 |
| 4 | **Digital Marketing Execution**<br>Basic elements of digital campaign management, search execution, display execution, social media execution, and content marketing. Digital Marketing Execution Elements<br>Digital revenue generation models, managing service delivery and payments, managing digital implementation challenges like e-commerce, internal & external, and consumer-specific challenges. | 08 |
| 5 | **Digital Business - Present and Future**<br>Digital Marketing - Global Landscape, digital marketing overview, global spend, advertising spend, and technology/tools landscape. Data technologies (Big data and IOT) impacting marketing, segment-based digital marketing, and SoLoMo - the next level of hyperlocal marketing. | 08 |
| | **Total** | 42 |

**Books Recommended:**

**Reference Books:**

1. Fundamentals of Digital Marketing by Puneet Singh Bhatia, Pearson Education Limited
2. Digital Marketing by Seema Gupta- McGraw Hill Education.
3. Digital Marketing Excellence: Planning, Optimizing and Integrating Online Marketing by Dave Chaffey and P. R. Smith, 5 th edition, Taylor & Francis.
4. Digital Marketing: Strategy, Implementation and Practice- 6th edition by Dave Chaffey Fiona Ellis-Chadwick, Pearson Education Limited,
5. Digital marketing by Vandana Ahuja, Oxford University Press.
6. The Art of Digital Marketing by Ian Dodson, John Wiley & Sons.

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | | | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Environmental Management | | | | | | | | | | Course Code: DJS22ILO8029 | | | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | | Total marks (A+B) | |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | | | |
| | | | | 65 | | | 20 | 15 | 35 | | | 100 | |
| | | | | Term Work | | | Laboratory Examination | | | | | | |
| 3 | – | – | 3 | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | | Oral & Practical | | – | |
| | | | | – | – | – | – | – | | – | | | |

**Pre-requisites:** Knowledge of environmental science.

**Course Objectives:**

1. Understand and identify environmental issues relevant to India and global concerns
2. Learn concepts of ecology
3. Familiarize environment related legislations
4. Understand Environmental Auditing Procedures.

**Course Outcomes:** On completion of this course, learner will be able to

1. Understand and identify environmental issues relevant to India and global concerns
2. Learn concepts of ecology
3. Familiarize environment related legislations
4. Understand Environmental Auditing Procedures.

| Environmental Management (DJS22ILO8029) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Principles of Environmental Management (EM):** Introduction of EM, Definition, Ecosystem concept, Participants in EM, Ethics and the environment, International Environmental Movement, Environmental issues relevant to India. | **08** |
| 2 | **Policy and Legal Aspects of EM:** - Introduction to various Environmental Policies, Indian and International Environmental laws and legislation.<br>**EM system Standards:** Core Elements, Benefits, Certification Body Assessment & Documentation for EMS, ISO-14000 Standards. | **09** |
| 3 | **Environmental Impact Assessment (EIA):** Purpose, steps, hierarchy of EIA, Environmental Impact Statement and Impact Indicators, Evolution of IA in India and worldwide. Preliminary stages of EIA, Impact, Prediction, Evaluation and Mitigation. | **09** |
| 4 | **Environmental Auditing (EA):-** Objectives, Scope and Types of EA, Audit Methodology, Elements of Audit Process, Auditing of EMS. | **08** |
| 5 | **Environmental Management Techniques:** - Environmental Monitoring and Modelling, Environmental technology Assessment and Environmental Risk Assessment, Eco-mapping. | **08** |
| | **Total** | **42** |

**Books Recommended:**

**Text Books:**

1. Environmental Management, T V Ramachandra and Vijay Kulkarni, TERI Press
2. Environmental Management: Principles and Practice, CJ Barrow, Routledge Publishers London, 1999

**Reference Books:**

1. A Handbook of Environmental Management Edited by Jon C. Lovett and David G. Ockwell, Edward Elgar Publishing
2. Indian Standard Environmental Management Systems Requirements with Guidance for Use, Bureau Of Indian Standards, February 2005
3. Environmental Management: An Indian Perspective, S N Chary and Vinod Vyasulu, Macmillan India, 2000
4. Introduction to Environmental Management, Mary K Theodore and Louise Theodore, CRC Press
5. Environment and Ecology, Majid Hussain, 3rd Ed. Access Publishing.2015

Thellokar.

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

Shri Vile Parle Kelavani Mandal's

# DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

(Autonomous College Affiliated to the University of Mumbai)

NAAC Accredited with "A" Grade (CGPA : 3.18)

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | | Final Year B.Tech | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Course : Labour and Corporate Law | | | | | | | | | | Course Code: DJS22ILO8029 | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | | Total marks (A+B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | | |
| | | | | 65 | | | 20 | 15 | 35 | | 100 |
| | | | | Term Work | | | Laboratory Examination | | | | |
| 3 | – | – | 3 | Laboratory Work | Tutorial / Mini project / presentation/ Journal/ Practical | Total Term work | Oral | Practical | Oral & Practical | | – |
| | | | | – | – | – | – | – | – | | |

**Course Objectives:**

1. To understand the development and judicial setup of Labour Laws.
2. To learn the laws relating to Industrial Disputes, Social Security and Working conditions.
3. To analyse the laws related to corporate governance in different settings.
4. To develop awareness of legal principles involved in economic relationships and business transactions.
5. To develop an understanding of free enterprise system and legal safeguards of the same.

**Course Outcomes:** On completion of this course, learner will be able to:

1. Illustrate the role of trade union in the industrial setup.
2. Understand the important causes, impact of industrial disputes and settlement procedures.
3. To provide in-depth understanding of corporate social responsibility.
4. Apply concepts, principles and theories to understand simple business laws.
5. Analyse the principle of international business and strategies adopted by firms to expand globally

| Labour and Corporate Law (DJS22ILO8030) | | |
|---|---|---|
| **Unit** | **Description** | **Duration** |
| 1 | **Trade Unions and Collective Bargaining:** Trade Unionism in India, Definition of Trade Union and Trade Dispute, General and Political Funds of Trade Union, Civil and Criminal Immunities of Registered Trade Unions, Recognition of Trade Union, Collective Bargaining | 08 |
| 2 | **Industrial Dispute and Instruments of Economic Coercion:** Industrial Dispute and Individual Dispute, Settlement of Industrial Dispute. Concept of strike, Gherao, Bandh, and Lock-out, Types of Strike, Rights to Strike and Lock-out | 09 |
| 3 | **Formation of a Company and Corporate Governance:** Company and Other Forms of Business Organizations, Different Kinds of Companies: One Person Company, Foreign Company. Kinds of Company Meetings and Procedure Powers, Duties, and Kinds of Directors: Independent Director, Women Director. Different Prevention of Oppression and Mismanagement, Investor Protection, Insider Trading, Corporate Fraud. | 09 |
| 4 | **Corporate Social Responsibility and Corporate Liquidation:** Evolution of Corporate Social Responsibility, Corporate Criminal Liability, Corporate Environmental Liability, Different Types of Winding up of Company, Role of Courts in Winding up of Company, Merger and Acquisition of Company, Cross-Border Merger, Takeover Code: Role of SEBI | 08 |
| 5 | Case Studies on<br>A) Labour law B) Labour relations C) Corporate laws D) Securities laws | 08 |
| | **Total** | 42 |

**Books Recommended:**

**Reference Books:**

1. Surya Narayan Misra, An Introduction to Labour and Industrial Law, Allahabad Law Agency, 1978
2. Indian Law Institute, Cases and Materials on Labour Law and Labour Relations
3. P.L. Malik, Industrial Law, Eastern Book Company, 2013
4. S.C. Srivastava, Industrial Relations and Labour Law, Vikas Publishing House, New Delhi
5. C.A. Kamal Garg, Bharat's Corporate and Allied Laws, 2013.
6. Institute of Company Secretaries of India, Companies Act 2013, CCH Wolter Kluver Business, 2013
7. Saleem Sheikh & William Rees, Corporate Governance & Corporate Control, Cavendish Publishing Ltd., 1995
8. Taxmann, A Comparative Study of Companies Act 2013 and Companies Act 1956

**Evaluation Scheme:**

**Semester End Examination (A):**

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions.

**Continuous Assessment (B):**

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project / group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Total of the marks scored in both the two tests will be considered for final grading

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**

| Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology) | | | | | | | | | Final Year B.Tech | Semester : VIII |
|---|---|---|---|---|---|---|---|---|---|---|
| Course : Project Stage II | | | | | | | | | Course Code: DJS22ICP803 | |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | Total marks (A+ B) |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test 2 | Total | |
| | | | | -- | | | -- | -- | -- | -- |
| | | | | Laboratory Examination | | | Term work | | | |
| -- | 10 | -- | 05 | Oral | Practical | Oral & Practical | Laboratory Work | Tutorial / Mini project / presentation / Assignment | Total Term work | 200 |
| | | | | -- | -- | 100 | -- | -- | 100 | |

**Course Objectives:** The objective of the course is:

1. To meet the milestones formed in the overall project plan decided in Project -I.
2. To implement the idea resented in Project -I with results, conclusion and future work. The project will culminate in the production of a thesis by each individual student.

**Course Outcomes:** On completion of the course, learner will be able to:

1. Develop the proposed solution using appropriate techniques.
2. Test the developed system for its correctness using appropriate techniques.
3. Work effectively as a member of the team.

**Guidelines:**

1. The department must allocate 2 days in the Semester VIII every week.
2. Students will do coding and testing in Semester VIII.
3. Each group along with its guide/mentor shall identify an appropriate technique/s for testing the developed system.

4. The project assessment for term work will be done at least two times at department level by giving presentation to panel members which consist of at least three (3) members as Internal examiners (including the project guide/mentor) appointed by the Head of the department of respective Program.
5. A report is to be prepared summarizing the findings of the literature survey, coding and testing.
6. Every team must publish their work in national / international conference/journals (if possible, publish in Scopus indexed journals).
7.At the end of semester a student need to prepare a project report as per the guidelines. Along with project report , research paper, project documentation, Implementation code, required utilities, Softwares and user manuals need to be attached.
8. All students must participate in the departmental event *Jigyasa*. A poster competition will be organized as part of this event.

**Evaluation Scheme:**
**Semester End Examination (A):**
**Laboratory:**
1. Each group will be jointly evaluated by a team of Internal and External Examiners approved by the University of Mumbai.
2. An oral exam will be conducted on the project done by the students. Oral examination of Project stage-II should be conducted by Internal and External examiners.
3. Students are expected to demonstrate the execution of their project during the examination.

**Continuous Assessment (B):**
**Laboratory: (Term work)**

The distribution of marks for term work shall be as follows:
1. Weekly Attendance on Project Day
2. Project work contribute
3. Mid-Sem Review
4. Project Report
5. Term End Presentation
6. Technical Paper/Copy Right Filed/Patent publication/Poster Presentation

| Prepared by | Checked by | Head of the Department | Vice Principal | Principal |
|---|---|---|---|---|

| Program: Final Year B.Tech. | | | | | | | | | | Semester: VIII |
|---|---|---|---|---|---|---|---|---|---|---|
| Course: Disaster Management and Preparedness | | | | | | | | | | Course Code: DJS22A4 |
| Teaching Scheme (Hours / week) | | | | Evaluation Scheme | | | | | | |
| | | | | Semester End Examination Marks (A) | | | Continuous Assessment Marks (B) | | | |
| Lectures | Practical | Tutorial | Total Credits | Theory | | | Term Test 1 | Term Test II / presentation / assignment / course project / group discussion / any other. | AVG | Total Marks = (A+ B) |
| | | | | - | | | - | - | - | - |
| | | | | Laboratory Examination | | | Term work | | Total Term work | |
| 2 | - | - | - | Oral | Practical | Oral & Practical | Laboratory Work | Tutorial / Mini project / presentation/ Journal | | - |
| | | | | - | - | - | - | - | - | |

Objectives:

1. To provide basic understanding of hazards, disasters and various types and categories of disaster occurring around the world.
2. To identify extent and damaging capacity of a disaster.
3. To study and understand the means of losses and methods to overcome /minimize it.
4. To understand roles and responsibilities of individual and various organizations during and after disaster.
5. To appreciate the significance of GIS, GPS in the field of disaster management.
6. To understand the emergency government response structures before, during and after disaster.

Outcomes: On completion of the course, the learner will be able to:

1. Apply disaster management principles & guidelines.
2. Conduct risk assessments.
3. Develop community awareness & participation.
4. Utilize Science & Technology tools (GIS, GPS).
5. Prepare disaster management plans.

**Detailed Syllabus: (unit-wise)**

| Unit | Description | Duration |
|---|---|---|
| 1 | **Understanding Disasters & Hazards:**<br>• **Definition and types of disasters**: Natural, Man-made and hybrid disasters, **Study of Natural disasters**: Flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion etc. **Study of Human/Technology Induced Disasters**: Chemical, Industrial and Nuclear disasters, internally displaced persons, road and train accidents Fire Hazards, terrorism, militancy,<br>• Hazard & Vulnerability profiles of India (seismic zones, flood-prone areas).<br>• India's vulnerability to disasters, and the impact of disasters on National development. | 06 |
| 2 | **Disaster Risk Reduction (DRR) & Mitigation:**<br>• **Disaster Management Cycle**: Prevention, Mitigation, Preparedness, Response, Recovery. Need for disaster prevention and mitigation, mitigation guiding principles, challenging areas, structural and non-structural measures for disaster risk reduction.<br>• Risk Assessment & Vulnerability Analysis.<br>• **Science & Technology**: Use of information management, Geo informatics like RS, GIS, GPS and remote sensing mitigation measure. | 06 |
| 3 | **Disaster Preparedness & Response:**<br>• Preparedness Planning, Early Warning Systems (EWS), & Communication.<br>• Emergency Response: Search & Rescue, Logistics, Medical Aid.<br>• Psychological Response & Management (Trauma, Stress).<br>• Role of IT, Media, Govt., NGOs, & Community. | 04 |
| 4 | **Recovery, Rehabilitation & Reconstruction:**<br>• Post-disaster damage assessment.<br>• Rehabilitation, Reconstruction, & Livelihood Restoration.<br>• Sanitation, Hygiene, & Waste Management. | 04 |
| 5 | **Policy, Governance & Capacity Building:**<br>• National Disaster Management Authority (NDMA) & Legislation.<br>• Institutional Mechanisms & Community Mobilization. Non-Structural Mitigation: Community based disaster preparedness, capacity development and training, awareness and education, contingency plans. | 04 |
| 6 | **Case studies on disaster (National /International):**<br>• Case study discussion of National Disasters: Tsunami (2004), Bhopal gas tragedy, Kerala and Uttarakhand flood disaster, 26th July 2005 Mumbai flood<br>• Case study discussion of International Disasters: Hiroshima – Nagasaki (Japan), Cyclone Phailin (2013), Fukushima, Daiichi nuclear disaster (2011), Chernobyl meltdown | 04 |
| | **Total Number of Hours** | 28 |

**Books Recommended:**

Reference Books and Reports:

1. Disaster Management, by Harsh K. Gupta, Universities Press Publications (2003).
2. Disaster Management: An Appraisal of Institutional Mechanisms in India, by O. S. Dagur, published by Centre for land warfare studies, New Delhi, 2011.
3. Introduction to International Disaster Management, by Damon Copolla, Butterworth Heinemann Elsevier Publications (2015).
4. Disaster Management Handbook, by Jack Pinkowski, CRC Press, Taylor and Francis group (2008).
5. Disaster management & rehabilitation, by Rajdeep Dasgupta, Mittal Publications, New Delhi (2007).
6. Natural Hazards and Disaster Management, Vulnerability and Mitigation, by R B Singh, Rawat Publications (2006).
7. Concepts and Techniques of GIS, by C. P. Lo Albert, K.W. Yonng, Prentice Hall (India) Publications (2006).
8. Risk management of natural disasters, by Claudia G. Flores Gonzales, KIT Scientific Publishing (2010).
9. Disaster Management – a disaster manger's handbook, by W. Nick Carter, Asian Development Bank (2008).
10. Disaster Management in India, by R. K. Srivastava, Ministry of Home Affairs, GoI, New Delhi (2011)
11. The Chernobyl Disaster: Legacy and Impact on the Future of Nuclear Energy, by Wil Mara, Marshall Cavendish Corporation, New York, 2011.
12. The Fukushima 2011 Disaster, by Ronald Eisler, Taylor & Francis, Florida, 2013.

(Learners are expected to refer reports published at national and international level and updated information available on authentic web sites.)

**Prepared by** **Checked by** **Head of the Department** **Vice Principal** **Principal**