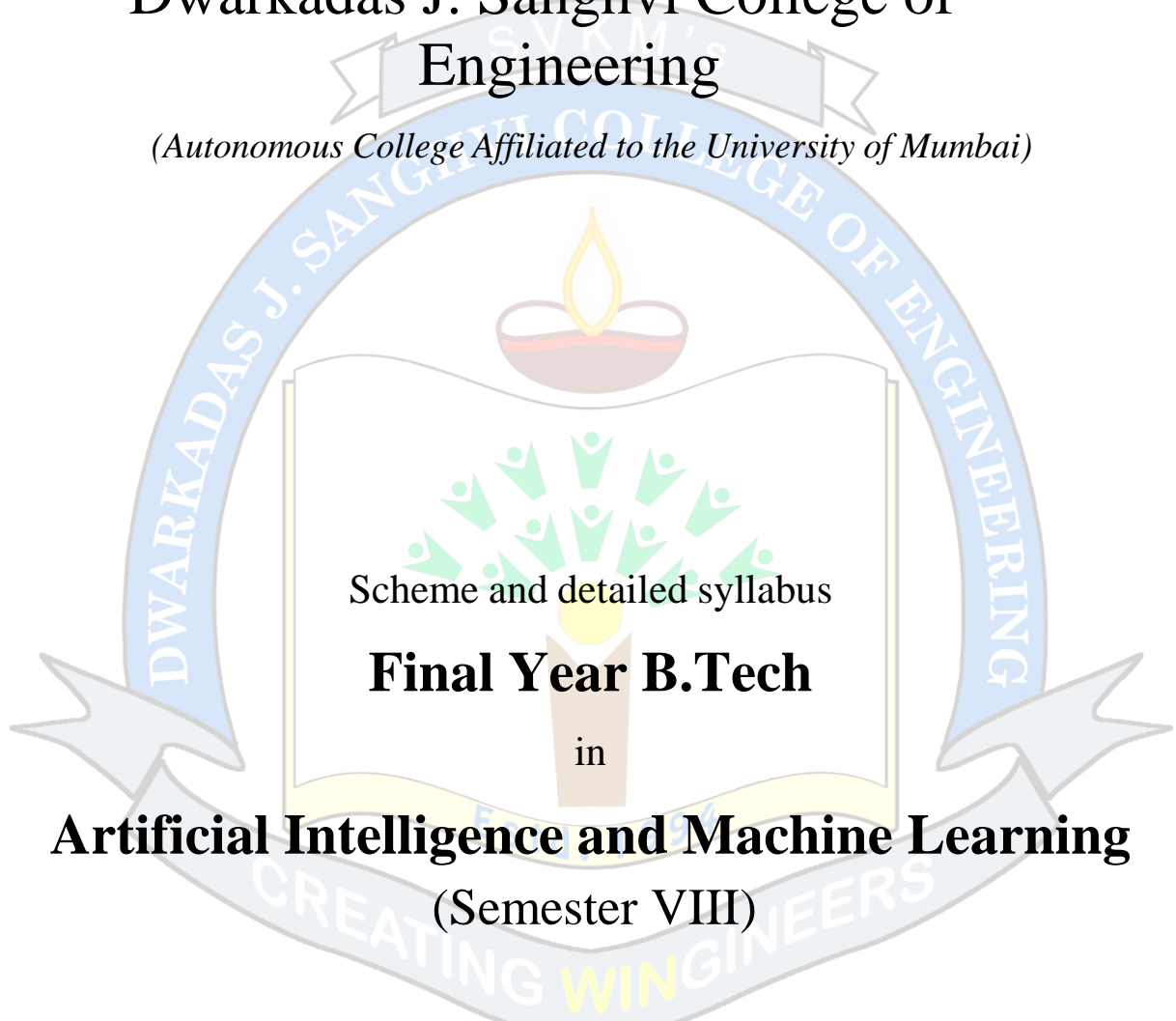




Shri Vile Parle Kelavani  
Mandal's

# Dwarkadas J. Sanghvi College of Engineering

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



Scheme and detailed syllabus

**Final Year B.Tech**

in

**Artificial Intelligence and Machine Learning**

(Semester VIII)

Academic Year 2024-25



**Proposed Scheme for Final Year Undergraduate Program in Artificial Intelligence and Machine Learning: Semester VIII (Autonomous)**  
**Academic Year(2024-25)**

Sr No	Course Code	Course	Teaching Scheme(hrs)				Continuous Assessment (A) (marks)			Semester End Assessment (B) (marks)					Aggregate (A+B)	Total Credits
			Th	P	T	Credits	Th	T/W	Total CA (A)	Th	O	P	O &P	Total SEA(B)		
1	DJ19AMC801	Reinforcement Learning	3	--	--	3	25	--	25	75	--	--	--	75	100	4
	DJ19AML801	Reinforcement Learning Laboratory	--	2	--	1	--	25	25	--	25	--	--	25	50	
2	DJ19AMC802	Ethical AI	3	--	--	3	25	--	25	75	--	--	--	75	100	4
	DJ19AML802	Ethical AI Laboratory	--	2	--	1	--	25	25	--	25	--	--	25	50	
3@	DJ19AMEC8011	AI in Healthcare	3	--	--	3	25	--	25	75	--	--	--	75	100	4
	DJ19AMEL8011	AI in Healthcare Laboratory	--	2	--	1	--	25	25	--	25	--	--	25	50	
	DJ19AMEC8012	Quantum AI	3	--	--	3	25	--	25	75	--	--	--	75	100	
	DJ19AMEL8012	Quantum AI Laboratory	--	2	--	1	--	25	25	--	25	--	--	25	50	
	DJ19AMEC8013	Image Generative AI	3	--	--	3	25	--	25	75	--	--	--	75	100	
	DJ19AMEL8013	Image Generative AI Laboratory	--	2	--	1	--	25	25	--	25	--	--	25	50	
4#	DJ19ILO8021	Project Management	3	--	--	3	25	--	25	75	--	--	--	75	100	3
	DJ19ILO8022	Entrepreneurship Development and Management														
	DJ19ILO8023	Corporate Social Responsibility														
	DJ19ILO8024	Human Resource Management														
	DJ19ILO8025	Corporate Finance Management														
	DJ19ILO8026	Logistics and Supply Chain Management														
	DJ19ILO8027	IPR and Patenting														
	DJ19ILO8028	Digital Marketing Management														
	DJ19ILO8029	Environmental Management														
	DJ19ILO8030	Labour and Corporate Law														
5	DJ19AMP803	Project Stage II	--	10	--	5	--	100	100	--	--	--	100	100	200	5
<b>Total</b>			<b>12</b>	<b>16</b>	<b>0</b>	<b>20</b>	<b>100</b>	<b>175</b>	<b>275</b>	<b>300</b>	<b>175</b>	<b>0</b>	<b>100</b>	<b>475</b>	<b>750</b>	<b>20</b>

Th	Theory	T/W	Termwork
P	Practical	O	Oral
T	Tutorial		

@ Any 1 Elective Course

# Any 1 Institute Level Elective

Prepared by

Checked by

Head of the Department

Vice Principal

Principal



**Continuous Assessment (A):**

Course	Assessment Tools	Marks	Time (hrs.)
Theory	One Term test (based on 40 % syllabus)	25 each (Avg.25)	1
	Second Term test (next 40 % syllabus ) / presentation / assignment / course project / group discussion / any other.		
Audit course	Performance in the assignments / quiz / power point presentation / poster presentation / group project / any other tool.	--	as applicable
Laboratory	Performance in the laboratory and documentation.	25	
Tutorial	Performance in each tutorial & / assignment.	25	
Laboratory & Tutorial	Performance in the laboratory and tutorial.	25	

The final certification and acceptance of term work will be subject to satisfactory performance upon fulfilling minimum passing criteria in the term work / completion of audit course.

**Semester End Assessment (B):**

Course	Assessment Tools	Marks	Time (hrs.)
Theory / * Computer based	Written paper based on the entire syllabus.	75	3
	* Computer based assessment in the college premises.		
Oral	Questions based on the entire syllabus.	25	as applicable
Practical	Performance of the practical assigned during the examination and the output / results obtained.	25	2
Oral & Practical	Project based courses - Performance of the practical assigned during the examination and the output / results obtained. Based on the practical performed during the examination and on the entire syllabus.	as per the scheme	2

Prepared by

Checked by

Department Coordinator

Vice-Principal

Principal



<b>Program: Artificial Intelligence &amp; Machine Learning</b>	<b>B.Tech.</b>	<b>Semester: VIII</b>
<b>Course: Reinforcement Learning (DJ19AMC801)</b>		
<b>Course: Reinforcement Learning Laboratory (DJ19AML801)</b>		

**Pre-requisite:** Machine Learning, Machine Learning-II and Artificial Intelligence.

**Course Objectives:** To make students learn to build programs that act in a stochastic environment, based on past experience using various Reinforcement Learning methods.

**Outcomes:** Students will be able to

1. Explain basic and advanced Reinforcement Learning techniques.
2. Identify suitable learning tasks to which Reinforcement learning and Deep Reinforcement Learning techniques can be applied.
3. Apply appropriate Reinforcement Learning method to solve a given problem.
4. Integrate deep learning techniques with reinforcement learning, including the use of neural networks for function approximation and policy representation.

<b>Reinforcement Learning (DJ19AMC801)</b>		
<b>Unit</b>	<b>Description</b>	<b>Duration</b>
1	<b>Introduction:</b> Reinforcement Learning (RL), Elements of Reinforcement Learning, Reinforcement Learning vs Supervised Learning, Approaches of solving Reinforcement Learning: Value based, policy based, model based, Exploration - Exploitation dilemma, Evolutionary methods, Immediate Reinforcement Learning.	04
2	<b>Immediate Reinforcement Learning:</b> <b>Bandit Problems:</b> Bandit problems, Value-action based methods (sample average), Greedy method, $\epsilon$ -greedy method, Incremental Implementation, Non-stationary problem, Optimistic Initial values, UCB algorithm, Thompson Sampling. <b>Policy Gradient Approaches:</b> Linear reward Penalty Algorithm, Parameterised policy representation( $\Theta$ ), Evaluation of policy( $\eta(\Theta)$ ), REINFORCE algorithm.	05
3	<b>Full Reinforcement Learning</b> Difference between Immediate and Full Reinforcement Learning, Agents and Environment, Goals, Rewards, Returns, Policy in Full Reinforcement Learning, Episodic and Continuing Tasks. <b>Markov Decision Process (MDP)</b> Markov Property, Finite Markov Decision Process, Value functions, Bellman's equations, optimal value functions, Definition of MDP in Reinforcement Learning, Solution of the Recycling Robot problem	06
4	<b>Dynamic Programing</b> Policy evaluation, policy improvement, policy iteration, value iteration, Asynchronous Dynamic Programing, Generalized Policy Iteration (GPI), bootstrap, full back up.	08



	<b>Monte Carlo Method</b> Advantages of Monte Carlo over Dynamic Programming, Monte Carlo Control, on-policy, off-policy, Incremental Monte Carlo, Issues/Assumptions in Monte Carlo Methods, Solution of BlackJack using Monte Carlo Method	
5	<b>Temporal Difference Learning</b> What is Temporal Difference learning, Advantages of Temporal Difference methods over Monte Carlo and Dynamic Programming methods, TD(0), On-policy vs off-policy, SARSA, Qlearning. <b>Eligibility traces</b> N-step Temporal Difference methods, On-line vs Off-line updation, TD( $\lambda$ ) : forward view, backward view, Traces: Accumulating trace, Dutch trace, Replacing trace, Equivalence of forward and backward view, SARSA( $\lambda$ )	08
6	<b>Function Approximation</b> Drawbacks of tabular implementation, Function Approximation, Gradient Descent Methods, Linear parameterization, Policy gradient with function approximation <b>Deep Reinforcement Learning</b> Intro of Deep Learning in Reinforcement Learning, Deep learning training workflow, Categories of Deep learning, Deep Q-Network, Ways of improving Deep Q-Network, REINFORCE in Full Reinforcement Learning, Actor-Critic Algorithm, Algorithm Summary, DDPG, Case study on AlphaGo by Google DeepMind	08
	<b>Total</b>	<b>39</b>

### Books Recommended:

#### Textbooks:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning: An Introduction", MIT Press, 2<sup>nd</sup> Edition, 2018.
2. Laura Graesser Wah Loon Keng, "Foundations of Deep Reinforcement Learning," Pearson Education, 1<sup>st</sup> Edition, 2020.

#### Reference Books:

1. Phil Winder, "Reinforcement Learning Industrial Applications of Intelligent Agents", O'Reilly, 1<sup>st</sup> Edition, 2020.
2. Csaba Szepesvari, "Algorithms for Reinforcement Learning," Morgan & Claypool Publishers, 1<sup>st</sup> Edition, 2019.
3. Enes Bilgin, "Mastering Reinforcement Learning with Python", Packt publication, 1<sup>st</sup> Edition, 2020.
4. Brandon Brown, Alexander Zai, "Deep Reinforcement Learning in Action", Manning Publications, 1<sup>st</sup> Edition, 2020.
5. Micheal Lanham, "Hands-On Reinforcement Learning for Games," Packt Publishing, 1<sup>st</sup> Edition, 2020.
6. Abhishek Nandy, Manisha Biswas, "Reinforcement Learning: With Open AI, TensorFlow and Keras using Python," Apress, 1<sup>st</sup> Edition, 2018.

#### Weblinks:



1. NPTEL Course in Reinforcement Learning: [https://onlinecourses.nptel.ac.in/noc22\\_cs75/preview](https://onlinecourses.nptel.ac.in/noc22_cs75/preview)
2. Reinforcement Learning Course (Stanford University): <https://www.youtube.com/watch?v=FgzM3zpZ55o>
3. AI Games with Deep Reinforcement Learning: <https://towardsdatascience.com/how-to-teach-an-ai-to-play-games-deep-reinforcement-learning-28f9b920440a>
4. Deep Reinforcement Learning: <https://www.v7labs.com/blog/deep-reinforcement-learning-guide>

**Suggested List of Experiments:**

<b>Reinforcement Learning (DJ19AML801)</b>	
<b>Sr. No.</b>	<b>Title of the Experiments</b>
1.	Implement Greedy and Epsilon greedy methods. Comparison between Greedy and Epsilon Greedy Policy
2.	Implement REINFORCE algorithm on a CartPole/ Lunar Lander
3.	Implementation of GridWorld using Dynamic Programming
4.	Dynamic Programming and Monte Carlo Methods <ul style="list-style-type: none"> <li>• Jack's Car Rental using Dynamic Programming</li> <li>• Gamblers Problem using Dynamic Programming</li> <li>• BlackJack using Monte Carlo</li> <li>• Race Track Problem</li> </ul>
5.	Implement Frozen lake using SARSA
6.	Implement Grid world using Q learning
7.	Implement Temporal Difference
8.	Compare the performance of Reinforcement Learning and Deep Reinforcement Learning on a Cartpole problem.
9.	Implementation of Deep Q-Network algorithm
10.	Actor Critic: Find the optimal policy using the Actor Critic method

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.



<b>Program: Artificial Intelligence &amp; Machine Learning</b>	<b>B.Tech.</b>	<b>Semester: VIII</b>
<b>Course: Ethical AI (DJ19AMC802)</b>		
<b>Course: Ethical AI Laboratory (DJ19AML802)</b>		

**Pre-requisite:** Artificial Intelligence, Machine Learning

**Course Objectives:**

1. To introduce the fundamental concepts of ethics in AI
2. To explore the importance of transparency in AI systems, identifying practices that enhance stakeholder understanding and facilitate accountability.
3. To explore and analyze emerging themes in AI governance and policy, such as ethical considerations, workforce impacts, and regulatory challenges, and their implications for the future of AI globally.

**Course Outcomes: Students will be able to**

1. Understand the principles of responsible AI development, including fairness, accountability, and transparency.
2. Identify and describe various sources of bias in AI systems, including data collection, feature selection, and model training processes. Analyze real-world examples of bias in AI applications.
3. Evaluate the role of fairness in AI governance. Identify strategies to promote equitable outcomes and mitigate biases in AI systems.
4. Analyze the implications of privacy and anonymity for individuals and organizations in the context of data management and usage.

<b>Ethical AI (DJ19AMC802)</b>		
<b>Unit</b>	<b>Description</b>	<b>Duration</b>
<b>1</b>	<b>Introduction</b> Artificial Intelligence Fundamentals, Need for ethics in AI. AI for Society and Humanity, ethics vs law/compliance, Responsible and interpretable AI, Principles for ethical practices, AI and social justice	<b>5</b>
<b>2</b>	<b>Bias and Fairness</b> Sources of Biases, Techniques for detecting, mitigating, and preventing bias in data and models, limitation of a dataset, Preprocessing, inprocessing and postprocessing to remove bias, Fairness of classification algorithms:	<b>8</b>



	Handling Disparate Treatment/Disparate Impact, Fair Embedding's, Counterfactual fairness,	
3	<b>Governance of AI</b> Role of government, academia, and industry in ethical AI development <sup>2</sup> , Integrity, Transparency, Accountability, Fairness, Control, Sustainability, Democracy, Interoperability, Spread of hate content, Countering hate speech, The future of AI and its impact on humanity.	8
4	<b>Transparency and Explainability in AI</b> Black-box AI vs. transparent AI. Explainability: methods and challenges, Explainability through causality, Model transparency, interpretability, and documentation in training processes, Model interpretability tools and frameworks (e.g., LIME, SHAP)	7
5	<b>Data ownership, privacy and anonymity</b> Understanding the difference between data ownership, data privacy and data anonymity, Idea behind surveillance, data privacy vs. data security, Security concerns in AI system, Differential privacy and federated learning in AI	5
6	<b>AI standards and regulation</b> National and international strategies on AI- Europe, North America, Asia, Africa, South America, Australia, International AI initiatives, Government Readiness for AI, Emerging Themes, Case studies: Healthcare robots	6
<b>TOTAL</b>		<b>39</b>

### Books Recommended:

#### Text Books:

1. Mark Coeckelbergh "AI Ethics", The MIT Press Essential Knowledge series 2020
2. Evren Eryurek, Uri Gilad, Valliappa Lakshmanan, Data Governance: The Definitive Guide - People, Processes, and Tools to Operationalize Data Trustworthiness, Shroff/O'Reilly, 1st Edition, 2021
3. Ian Foster, Rayid Ghani, Ron S. Jarmin, Frauke Kreuter, Julia Lane, Big Data and Social Science: Data Science Methods and Tools for Research and Practice, Chapman and Hall/CRC, 2nd Edition, 2020.
4. AJ Kelly "Ethics and Artificial Intelligence: A Comprehensive Guide", by Byte-Sized Press, January 2023
5. Jonas Tallberg, Eva Erman, Markus Furendal, Johannes Geith, Mark Klamberg, Magnus Lundgren "The Global Governance of Artificial Intelligence: Next Steps for Empirical and Normative Research", Oxford University Press (OUP), 2023
6. Edited by Keith Frankish "The Cambridge Handbook of Artificial Intelligence", The Open University, Las Vegas, 2014





**Reference Books:**

1. Michael Negnevitsky, "Artificial Intelligence: A Guide to Intelligent Systems" ,2001
2. Markus Dubber, Frank Pasquale, Sunit Das, "OXFORD HANDBOOK OF ETHICS OF AI", 2021
3. Michael Kearns and Aaron Roth "The Ethical Algorithm: The Science of Socially Aware Algorithm Design", 2019
4. Solon Barocas, Moritz Hardt, and Arvind Narayanan "Fairness and Machine Learning: Limitations and Opportunities", 2023
5. Christoph Stückelberger, Pavan Duggal, Data Ethics: Building Trust: How Digital Technologies Can Serve Humanity, Globethics Publications, 1st Edition, 2023.
6. Gry Hasselbalch & Pernille Tranberg, Data Ethics, PubliShare, 1st Edition, 2016.
7. Evren Eryurek, Uri Gilad, Valliappa Lakshmanan, "Data Governance: The Definitive Guide - People, Processes, and Tools to Operationalize Data Trustworthiness" Shroff/O'Reilly, 1st Edition, 2021

**Web links:**

1. <https://standards.ieee.org/initiatives/autonomous-intelligence-systems/>
2. <https://partnershiponai.org/>
3. <https://aiethicslab.com/>
4. <https://www.oxford-aiethics.ox.ac.uk/>
5. <https://www.media.mit.edu/groups/ethics-and-governance/overview/>

**Suggested List of Experiments:**

<b>Ethical AI Laboratory(DJ19AML802)</b>	
<b>Sr. No.</b>	<b>Title of the Experiment</b>
<b>1</b>	Perform EDA to figure out missing data.
<b>2</b>	Perform LIME - Local Interpretable Model-Agnostic Explanations
<b>3</b>	Implement Detect and mitigate age bias in predictions.
<b>4</b>	Implement Meta-Algorithm for fair classification .
<b>5</b>	Implement Discover, Measure, and Mitigate Bias in Advertising
<b>6</b>	Implementing a simple white-box attack using the Privacy Meter.
<b>7</b>	Analyze Privacy Meter by executing a population attack on the CIFAR10 dataset.
<b>8</b>	Research and analyze recent data privacy violations and their impact on individuals and society
<b>9</b>	Identification On Optimization In AI Affecting Ethics

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.



<b>Program: Artificial Intelligence &amp; Machine Learning</b>	<b>B.Tech.</b>	<b>Semester: VIII</b>
<b>Course: AI in Healthcare (DJ19AMEC8011)</b>		
<b>Course: AI in Healthcare Laboratory (DJ19AMEL8011)</b>		

**Pre-requisite:**

- Knowledge of Machine Learning (Supervised/Unsupervised Learning).
- Understanding of Deep Learning and Neural Networks.
- Familiarity with Data Science tools (Python, TensorFlow/PyTorch).

**Course Objectives:**

1. To understand the role of AI in transforming healthcare.
2. To learn how to apply AI techniques such as machine learning, deep learning, and natural language processing (NLP) to healthcare data.
3. To gain hands-on experience in working with real healthcare datasets.
4. To discuss ethical, privacy, and regulatory concerns related to AI in healthcare.

**Course Outcomes:** Upon completion of this course, students will be able to:

1. Classify the types of AI systems used in healthcare, including ML, natural language processing (NLP), and expert systems, and explain their role in healthcare transformation.
2. Apply data mining techniques to healthcare datasets, EHRs, DICOM standards and exploratory data analysis (EDA) for medical imaging data.
3. Explore AI applications in genomics, including various NGS pipelines, and evaluate how AI can predict genetic disorders and pandemics.
4. Evaluate AI's potential for discovering new drug candidates and streamlining clinical trial processes.

<b>Artificial Intelligence in Healthcare (DJ19AMEC8011)</b>		
<b>Unit</b>	<b>Description</b>	<b>Duration</b>
<b>1</b>	<p><b>Introduction to AI in Healthcare:</b>  <b>Overview of AI in Healthcare:</b> Historical perspective, Types of AI systems in healthcare, Role of AI in healthcare transformation  <b>Key Healthcare Domains for AI Applications:</b> Medical imaging, Diagnostics, Drug discovery, Personalized medicine  <b>Challenges in Healthcare Data:</b> Data variability, noise, and incompleteness, Data privacy and security concerns, Regulatory constraints.</p>	<b>05</b>
<b>2.</b>	<p><b>Data Mining and Agents for Healthcare</b>            Introduction to Healthcare Data: Electronic Health Records (EHR), Medical imaging data (X-rays, MRIs, CT scans), Genomics and clinical trial data. Different 2D medical imaging modalities and their clinical applications, key stakeholders in the 2D medical imaging space, DICOM standards, DICOM dataset preparation, EDA Knowledge discovery and Data Mining, Evolutionary Algorithms, Illustrative Medical Application-</p>	<b>10</b>



	Multiagent Infectious Disease Propagation and Outbreak Prediction, Automated Amblyopia Screening System etc.	
3	<b>AI in Genomics and Disease Prediction:</b> Introduction to Molecular Biology, evolution of Bioinformatics – sequence alignment- indels, homology, identity, similarity, Orthology, paralogy and Xenology, Various NGS pipelines and tools, NCBI- genbank, Unitprot-Swissprot, KEGG, Genomics ad Pandemic Prediction	07
4	<b>AI-Driven Drug Discovery and Protenomics:</b> Introduction to computational drug discovery and AI Case studies: AI in accelerating drug development <b>AI for Personalized Medicine:</b> AI-based genomic analysis, Predicting patient responses to therapies, Tailoring treatment plans using AI models	07
5	<b>Emerging Trends of AI in Healthcare:</b> <b>Wearable AI and Remote Monitoring:</b> AI for patient monitoring using IoT and wearables <b>AI in Robotics and Surgery:</b> AI-assisted surgeries, robotic platforms and automation <b>Telemedicine and AI Integration:</b> AI-driven remote consultations and diagnostics	05
6	<b>Privacy, and Regulations in Healthcare:</b> <b>Ethical Considerations in AI for Healthcare:</b> Bias in AI models and its implications, AI decision-making in healthcare <b>Privacy and Security in Healthcare AI:</b> Handling sensitive healthcare data, Regulations: HIPAA, GDPR, and their implications for AI <b>Regulatory Aspects and AI Approval:</b> AI in clinical trials and FDA approvals	05
<b>TOTAL</b>		<b>39</b>

**Books Recommended:**

**Text Books:**

1. Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Hui Yang and Eva K. Lee, Wiley Publication, 2016
2. Artificial Intelligence in Healthcare, Adam Bohr and Kaveh Memarzadeh , Science Direct, 2020

**Reference Books:**

1. Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again., Topol E. New York, NY: Basic Books; 2019
2. "Medical Image Analysis" by Alejandro Frangi et al. Elsevier, 2023

**Online Resources:**

1. <https://ai.stanford.edu/>
2. <https://drerictopol.com/tag/medical-ai/>
3. <https://medicalfuturist.com/>
4. <https://blogs.nvidia.com/blog/tag/healthcare-life-sciences/>
5. <https://www.coursera.org/specializations/ai-for-medicine>



**Suggested List of Experiments (Any 8):**

<b>Artificial Intelligence in Healthcare Laboratory (DJ19AMEL8011)</b>	
<b>Sr. No.</b>	<b>Title of the Experiment</b>
1	Perform data preprocessing (cleaning, normalization) on an EHR dataset
2	Implement classification models (e.g., Decision Trees, Random Forest) to predict disease outcomes using structured healthcare data.
3	Apply clustering techniques (e.g., K-Means, DBSCAN) for patient stratification.
4	Use time-series analysis (e.g., LSTM) for health monitoring, predicting patient vitals over time.
5	Develop a Convolutional Neural Network (CNN) for medical image classification.
6	Implement U-Net or similar architecture for segmentation of medical images (e.g., tumor localization).
7	Use NLP techniques to extract insights from clinical notes or research papers.
8	Perform AI-assisted drug discovery using molecular structure datasets.
9	Use machine learning to analyze genomic data for personalized treatment recommendations.
10	Evaluate bias in AI models trained on healthcare data, and propose solutions to mitigate it.
11	Implement machine learning models to analyze sensor data (e.g., Fitbit) for real-time health monitoring.
12	Develop a basic AI-driven chatbot for telemedicine, enabling virtual consultations.

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt



<b>Program: Artificial Intelligence &amp; Machine Learning</b>	<b>B.Tech.</b>	<b>Semester: VIII</b>
<b>Course: Quantum AI (DJ19AMEC8012)</b>		
<b>Course: Quantum AI Laboratory (DJ19AMEL8012)</b>		

**Pre-requisite:** Artificial Intelligence, Machine Learning

**Course Objectives:**

1. To get acquainted with the principles of quantum computing and the usage of Linear algebra in Quantum Computing
2. To understand the Architecture of Quantum computing and solve examples of Quantum Fourier Transforms
3. To study the Quantum Theory with Fault-Tolerant Quantum techniques
4. To understand Problem-Solving using various peculiar search strategies for AI

**Course Outcomes: Students will be able to**

1. Understand quantum requirements and formulate design solutions using quantum circuits.
2. Illustrate applicable solutions in one or more application domains using a quantum architecture that integrates ethical, social, and legal concerns.
3. Apply the Advanced Quantum Algorithms on real time problem.
4. Evaluate suitable algorithms for AI problems.

Unit	Description	Duration
1	<b>Overview of Quantum Computation:</b> Single qubit gates, Multiple qubit gates, Measurements in bases Vs computational basis, Quantum circuits, Qubit copying circuit, Example: Bell states & quantum teleportation.	7
2	<b>Quantum Architecture</b> The Framework of Quantum Mechanics: The State of a Quantum System, Time-Evolution of a Closed System, Composite Systems, Mixed States and General Quantum Operations, Universal Sets of Quantum Gates, Quantum measurement and quantum entanglement, The quantum Fourier transform and its Applications- The quantum Fourier transform, Phase estimation, order-finding and factoring, General applications of the quantum Fourier transform- Period- finding, Discrete logarithms	7
3	<b>Quantum Algorithms</b> Probabilistic Versus Quantum Algorithms, Phase Kick-Back, The Deutsch Algorithm, The Deutsch-Jozsa Algorithm, Simon's Algorithm, Shor's Algorithm, Factoring Integers, Grover's Algorithm	7



4	<b>Quantum Clustering and Data Analysis</b> Quantum Clustering Techniques, Quantum-enhanced K-means clustering using quantum annealing: Using quantum-inspired methods for data partitioning, Quantum walk-based clustering: applying quantum walks to explore data distributions. Applications of Quantum Clustering: Implementing quantum clustering algorithms on a quantum simulator, Comparing quantum clustering performance with classical clustering.	7
5	<b>Quantum Information Processing</b> Classical Error Correction: The Error Model Encoding, Error Recovery, The Classical Three-Bit Code, Fault Tolerance, Quantum Information: Quantum Teleportation, Quantum Dense Coding, Coding, Quantum Key Distribution, Distribution, Noise and error models in quantum systems, Quantum cryptography and secure communication	7
6	<b>Quantum AI applications</b> Quantum AI Application: Introduction to PennyLane : a cross -platform Python library, Quantum Neural Computation, Quantum Walk – Randominsect	4
<b>Total</b>		<b>39</b>

#### Books Recommended:

##### *Text Books:*

1. Thomas G. Wong, "Introduction to Classical and Quantum Computing"2022,
2. Francesco Petruccione and Maria Schuld, "Machine Learning with Quantum Computers", 2021
3. Nielsen, M. & Chuang I., "Quantum Computation and Quantum Information",2020.
4. Santanu Pattanayak, "Quantum Machine Learning with Python", 2021.
5. Ray LaPierre, "Introduction to Quantum Computing", 2021.
6. Andreas Wichert, "Quantum Artificial Intelligence with Qiskit", 2024

##### *Reference Books:*

1. Pethuru Raj, Abhishek Kumar, Ashutosh Kumar Dubey, Surbhi Bhatia, Oswalt Manoj S, "Quantum Computing and Artificial Intelligence", 2023.
2. Shah Rukh, "Quantum Artificial Intelligence", 2023.
3. Samuel González Castillo, "A-Practical-Guide-to-Quantum-Machine-Learning-and-Quantum-Optimization", 2023
4. Rieffel, E. G., &Polak, W. H. "Quantum computing: A gentle introduction". MIT Press, 2011.
5. Farhi, E., Goldstone, J., & Gutmann, S. "A quantum approximate optimization algorithm". arXivpreprint arXiv:1411.4028,2014.



- Russell, S. & Norvig, P., "Artificial Intelligence: A modern approach". 4th Ed., Pearson Education, 2021

**E-Resources:**

- <http://mmrc.amss.cas.cn/tlb/201702/W020170224608149940643.pdf>
- <https://arxiv.org/pdf/1611.09347.pdf>
- <http://mmrc.amss.cas.cn/tlb/201702/W020170224608150244118.pdf>
- [https://www.researchgate.net/publication/282378154\\_FPGA-based\\_quantum\\_circuit\\_emulation](https://www.researchgate.net/publication/282378154_FPGA-based_quantum_circuit_emulation)
- Microsoft Quantum Development Kit  
<https://www.microsoft.com/enus/quantum/development-kit>
- Learn quantum programming: <https://pennylane.ai/qml/>
- Quantum machine learning: <https://qiskit.org/learn/course/machine-learning-course/>
- Center for Excellence in Quantum Technology: <https://research.ibm.com/blog/next-wave-quantum-centric-supercomputing>

**Web Links:**

- <https://learn.qiskit.org/course/quantum-hardware/introduction-to-quantum-errorcorrection-via-the-repetition-code>
- <https://quantumcomputinguk.org/tutorials/16-qubit-random-number-generator>
- <https://quantumcomputinguk.org/tutorials/quantum-fourier-transform-in-qiskit>
- <https://www.sciencedaily.com/releases/2021/02/210212094105.htm>
- <https://www.medrxiv.org/content/10.1101/2020.11.07.20227306v1.full>

**Suggested List of Experiments:**

Quantum AI Laboratory (DJ19AMEL8012)	
Sr. No.	Title of the Experiment
1	Implementations of 16 Qubit Random Number Generator
2	Implement a quantum teleportation protocol using three qubits and Bell state measurements
3	Implement the CNOT gate on two qubits and observe the entangled output
4	Implementing a 5 qubit Quantum Fourier Transform
5	Implement the Deutsch and Deutsch-Jozsa algorithms to differentiate between constant and balanced functions.
6	Implement the classical 3-bit error correction code and extend the concept to the quantum domain with a simple qubit code.
7	Study the impact of Noise on qubits and implement quantum error correction techniques to counteract it.



8	Use the PennyLane library to simulate a simple quantum neural network and train it on a basic dataset.
9	Explore a case study on quantum-centric supercomputing for a data science problem.

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.



Prepared by

Checked by

Head of the Department

Vice Principal

Principal





<b>Program: Artificial Intelligence &amp; Machine Learning</b>	<b>B.Tech.</b>	<b>Semester: VIII</b>
<b>Course: Image Generative AI (DJ19AMEC8013)</b>		
<b>Course: Image Generative AI Laboratory (DJ19AMEL8013)</b>		

**Pre-requisite:** Deep Learning, Large Language Models

**Course Objectives:**

1. To provide students with a thorough grasp of image generative AI, including its historical context, key technologies, and applications across various industries.
2. To Equip students with hands-on experience in image generation techniques, manipulation, and evaluation methods.
3. Enable students to explore and analyze the diverse applications of image generative AI in fields such as art, healthcare, and entertainment.
4. Foster an understanding of the ethical considerations and societal impacts of image generation technologies, preparing students to address potential challenges and biases in the field.

**Course Outcomes: Students will be able to**

1. Understand the principles of Image Generation and Implement Image Manipulation Techniques.
2. Compare and contrast various generative models, including GANs and VAEs, and apply their architectures to real-world problems.
3. Demonstrate proficiency in using diffusion models and vision transformers in generating images and utilize vision language models to create and interpret text-image pairs, including text-to-image and image-to-text generation.
4. Understand and apply techniques for video generation and critically assess the ethical implications of image generation.

<b>Image Generative AI (DJ19AMEC8013)</b>		
<b>Unit</b>	<b>Description</b>	<b>Duration</b>
1	<b>Introduction and Applications of Image Generation:</b> Overview of Image Generation, Historical Context and Evolution, Challenges, Types of Image Generation Techniques, Applications in Various Industries: Art and Design, Image-to-Image Translation, Super-Resolution, Face Generation, Deepfakes, 3D Image Generation.	5
2	<b>Image Manipulation and Representation:</b> Introduction to Image Manipulation Techniques and overview of CNNs in Image Processing, Neural Style Transfer (NST), Encoding Images, image Representation techniques, Feature extraction methods, Latent Vector Representation, Evaluation Metrics for Generated Images : FID, PSNR, SSIM	6



3	<b>VAEs and Variants of Generative Adversarial Networks:</b> Architecture of GANs: Generator and Discriminator, Training GANs, Training dynamics and common pitfalls, Variants of GANs (e.g., DCGAN, StyleGAN), Introduction to Variational Autoencoders (VAEs), Advanced VAE Techniques: Variational inference and reparameterization trick. Conditional VAEs (CVAE) and Extensions.	8
4	<b>Diffusion Models and Vision Transformers:</b> Introduction to Diffusion Models, Concepts and architecture overview , Denoising Diffusion Probabilistic Model, Stochastic Differential Equation (SDE), Diffusion Probabilistic Models: Concept & Architecture (DALL-E, Stable Diffusion), Transformers in Image Generation, understanding transformer architecture, Hybrid models (e.g., VQ-VAE-2, LDM), Exploring combinations of different generative techniques.	8
5	<b>Vision Language Models and Image Generation:</b> Introduction to Vision Language Models (VLMs), Understanding their purpose and functionality, Contrastive Language Image Pairs (CLIP), understanding CLIP Architecture and its applications, Text-to-Image Generation, Techniques and tools for generating images from text & Image-to-Text Generation, exploring methods for creating descriptions from images.	7
6	<b>Video Generation &amp; Ethical Considerations</b> <b>Video Generation:</b> Video Generation Techniques, Popular Models and Applications <b>Ethical Considerations:</b> Ethical Implications of Image Generation Technologies, Addressing Bias in AI-generated Content, Future Trends in Image Generation Research and Application	5
<b>TOTAL</b>		39

### Books Recommended:

#### Text Books:

1. Denis Rothman, "Transformers for Natural Language Processing- Build innovative deep neural network architectures for NLP with Python, PyTorch, TensorFlow, BERT, RoBERTa, and more", Second Edition, Packt Publishing, 2023.
2. Zonunfeli Ralte, Indrajit Kar, "Learn Python Generative AI: Journey from autoencoders to transformers to large language models", First Edition 2024, ISBN: 978-93-55518-972.
3. Soon Yau Cheong, "Hands-On Image Generation with TensorFlow: A practical guide to generating images and videos using deep learning", Packt Publishing, 2020.
4. David Foster, "Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play", O'Reilly Media, Inc. June 2019, ISBN: 9781492041948.

#### Reference Books:

1. Martin Yanev, "Building AI Applications with OpenAI APIs: Leverage ChatGPT, Whisper, and DALL-E APIs to build 10 innovative AI projects, Second Edition" Packt Publishing, 2024.



2. Amita Kapoor, Antonio Gulli, Sujit Pal, “Deep Learning with TensorFlow and Keras – 3rd edition: Build and deploy supervised, unsupervised, deep, and reinforcement learning models” , Third Edition, Packt Publishing, 2022.
3. V Kishore Ayyadevara, Yeshwanth Reddy, “Modern Computer Vision with PyTorch: Explore deep learning concepts and implement over 50 real-world image applications” Packt Publishing, 2020.
4. Martinez, “TensorFlow 2.0 Computer Vision Cookbook: Implement machine learning solutions to overcome various computer vision challenges”, 1st Edition, ” Packt Publishing, 2021.

**Web Links:**

1. [https://www.tensorflow.org/tutorials/generative/style\\_transferhttps://openai.com/index/clip/](https://www.tensorflow.org/tutorials/generative/style_transferhttps://openai.com/index/clip/)
2. <https://www.coursera.org/specializations/deep-learning>
3. <https://medium.com/@zhonghong9998/neural-style-transfer-creating-artistic-images-with-deep-learning-803409fc64c0>
4. <https://medium.com/@outerrencedl/a-simple-autoencoder-and-latent-space-visualization-with-pytorch-568e4cd2112a>
5. <https://pyimagesearch.com/2020/03/30/autoencoders-for-content-based-image-retrieval-with-keras-and-tensorflow/>
6. <https://realpython.com/generative-adversarial-networks/>
7. <https://towardsdatascience.com/reparameterization-trick-126062cfd3c3>
8. <https://shashank7-iitd.medium.com/understanding-vector-quantized-variational-autoencoders-vq-vae-323d710a888a>

**Suggested List of Experiments:**

<b>Image Generative AI Laboratory (DJ19AMEL8013)</b>	
<b>Sr. No.</b>	<b>Title of the Experiment</b>
1	Implement Neural Style Transfer on a set of images and compare results based on different styles.
2	Encode a set of images using autoencoders and visualize the latent space representation.
3	Evaluate the quality of generated images using different metrics (e.g., FID, PSNR).
4	Build and train a basic GAN, observing the training process and quality of generated images.
5	Explore different variants of GANs (e.g., DCGAN, StyleGAN) and report on their performance on a common dataset.
6	Implement and compare a Variational Autoencoder with and without the reparameterization trick.
7	Analyze the architecture of a diffusion model (e.g., DALL-E) and generate images using available pre-trained models.
8	Explore the application of transformers in image generation and implement a basic transformer model for image tasks.
9	Create and evaluate a hybrid model using VQ-VAE-2 and diffusion techniques.



10	Utilize CLIP to generate text-image pairs and evaluate their relevance and accuracy.
11	Develop a simple text-to-image generation model using available libraries.
12	Create a project that showcases the interaction between text and images, evaluating the generated outcomes.

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.



Prepared by

Checked by

Head of the Department

Vice Principal

Principal



<b>Program: Final Year (Common for All Programs)</b>					<b>Semester: VIII</b>				
<b>Course: Project Management</b>					<b>Course Code: DJ19ILO8021</b>				
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 2	Total
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
3	-	-	3	-	-	-	-	-	-

**Pre-requisites: Basic concepts of Management.**

**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.

**Outcomes:** On completion of the 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.



Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<b>Project Management Foundation:</b> 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 organization structures, PM knowledge areas as per Project Management Institute (PMI).	07
2	<b>Initiating Projects:</b> How to get a project started, selecting project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter, Effective project team, Stages of team. development & growth (forming, storming, norming & performing), team dynamics.	08
3	<b>Project Planning:</b> Work Breakdown structure (WBS) and linear responsibility chart, Project cost estimation and budgeting, Top down and bottoms 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	<b>Monitoring and Controlling Projects:</b> 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 value of work completed, using milestones for measurement, change requests and scope creep, Project audit. Project Contracting Project procurement management, contracting and outsourcing.	07
5	<b>Closing the Project:</b> 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.	07
	<b>Total</b>	39

### Books Recommended:

#### Text books:

1. Project Management: A managerial approach, Jack Meredith & Samuel Mantel, 7<sup>th</sup> Edition, Wiley India.
2. Project Management: The Managerial Process, 6th edition, Erik Larson, Clifford Gray, McGraw Hill Education.



### Reference Books:

1. A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 5<sup>th</sup> 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 based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

#### Continuous Assessment (B):

##### Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

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Checked by

Head of the Department

Vice Principal

Principal



<b>Program: Final Year (Common for All Programs)</b>				<b>Semester: VIII</b>					
<b>Course: Entrepreneurship Development and Management</b>				<b>Course Code: DJ19ILO8022</b>					
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 2	Total
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	-	-	3	-	-	-	-	-	-

**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

**Outcomes:** 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.

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	Meaning of entrepreneur - 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 entrepreneurial process Develop idea generation, creative and innovative skills	07
2	Business Planning Process: 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	<b>Institutions Supporting Entrepreneurs:</b> Small industry financing 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	07
4	<b>Micro, Small, and Medium Enterprises (MSMES):</b> 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	08
5	<b>Finance, Account, Costing and Legal Aspect of Business:</b> 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 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
<b>Total</b>		39

### 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 based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.



**Continuous Assessment (B):**

**Theory:**

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

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Head of the Department

Vice Principal

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<b>Program: Final Year (Common for All Programs)</b>				<b>Semester: VIII</b>					
<b>Course: Corporate Social Responsibility</b>				<b>Course Code: DJ19ILO8023</b>					
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 2	Total
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
				-	-	-	-	-	

**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

**Outcomes:** On completion of the 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

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<b>Introduction to CSR</b> Meaning and Definition, History of CSR, Concepts of Charity, Corporate philanthropy, Corporate Citizenship, Sustainability and Stakeholder Management. Environmental aspect of CSR Chronological evolution and Models of CSR in India Carroll's model Major codes on CSR Initiatives in India.	07
2	<b>International framework for Corporate Social Responsibility</b> 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 tri-partite declaration of principles on multinational enterprises and social policy.	08



<b>3</b>	<b>CSR-Legislation in India and the World</b> Section 135 of Companies Act 2013.Scope for CSR Activities under Schedule VII, Appointment of Independent Directors on the Board, and Computation of Net Profit's Implementing Process in India.	08
<b>4</b>	<b>The Drivers of CSR in India</b> 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 successful corporate initiatives and challenges of CSR. Case Studies of Major CSR Initiatives, Corporate Social Responsibility and Public-Private Partnership (PPP).	08
<b>5</b>	<b>Identifying key stakeholders of CSR</b> Role of Public Sector in Corporate, government programs, Nonprofit and Local Self Governance in implementing CSR, Global Compact Self-Assessment Tool, National Voluntary Guidelines by Govt. of India, Roles and responsibilities of corporate foundations.	08
<b>Total</b>		<b>39</b>

### 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

### 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=HPHgtIxMOuvvHQ->
2. Evolution, theories, stakeholders, Corporate Governance and Citizenship  
[https://youtu.be/VM\\_E0RRUe9I?si=JlcMuOasEqD7br4C](https://youtu.be/VM_E0RRUe9I?si=JlcMuOasEqD7br4C)



## **Evaluation Scheme:**

### **Semester End Examination (A):**

#### **Theory:**

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

### **Continuous Assessment (B):**

#### **Theory:**

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average 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

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<b>Program: Final Year (Common for All Programs)</b>					<b>Semester: VIII</b>					
<b>Course: Human Resource Management</b>					<b>Course Code: DJ19ILO8024</b>					
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	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
3	-	-	3	-	-	-	-	-	-	

**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.

**Outcomes:** On completion of the 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.



<b>Detailed Syllabus (Unit wise)</b>		
<b>Unit</b>	<b>Description</b>	<b>Duration in Hours</b>
<b>1</b>	<b>Introduction to HR</b> 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, Managing ethical issues.	07
<b>2</b>	<b>Organizational Behaviour (OB)</b> Introduction to OB Origin, Nature and Scope of Organizational Behaviour, Relevance to Organizational Effectiveness and Contemporary issues. Personality: Meaning and Determinants of Personality, Personality development, Personality Types, Assessment of Personality Traits for Increasing Self Awareness. Perception: Attitude and Value, Effect of perception on Individual Decision-making. Attitude and Behaviour. Motivation: Theories of Motivation and their Applications for Behavioural Change (Maslow, Herzberg, McGregor); 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.	08
<b>3</b>	<b>Organizational Structure &amp; Design</b> Structure, size, technology, Environment of organization; Organizational Roles & conflicts: Concept of roles; role dynamics; role conflicts and stress. Leadership: Concepts and skills of leadership, Leadership and managerial roles, Leadership styles and contemporary issues in leadership. Power and Politics: Sources and uses of power, Politics at workplace, Tactics and strategies.	08
<b>4</b>	<b>Human resource Planning</b> Recruitment and Selection process, Job-enrichment, Empowerment-Job Satisfaction, employee morale. Performance Appraisal Systems: Traditional & modern methods, Performance Counselling. Career Planning. 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
<b>5</b>	<b>Labor Laws &amp; Industrial Relations:</b> Evolution of IR, IR issues in organizations, Overview of Labor Laws in India; Industrial Disputes Act, Trade Unions Act, Shops and Establishments Act. <b>Emerging Trends in HR</b> Organizational development; Business Process Re-engineering (BPR), BPR as a tool for organizational development, managing processes & transformation in HR. Organizational Change, Culture, Environment. 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 difference in employee motivation.	08
	<b>Total</b>	39



### **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, 15th edition, 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](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](https://onlinecourses.swayam2.ac.in/nou20_mg02/preview)

### **Evaluation Scheme:**

#### **Semester End Examination (A):**

#### **Theory:**

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

#### **Continuous Assessment (B):**

#### **Theory:**

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.





<b>Program: Final Year (Common for All Programs)</b>				<b>Semester: VIII</b>					
<b>Course: Corporate Finance Management</b>				<b>Course Code: DJ19ILO8025</b>					
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 2	Total
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	-	-	3	-	-	-	-	-	-

**Pre-requisites:** Basic Knowledge of Algebra, Probability and Statistics.

**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.
3. Knowledge about sources of finance, capital structure, dividend policy.

**Outcomes:** On completion of the 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.

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
01	<b>Overview of Indian Financial System:</b> Characteristics, Components and Functions of 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	07



02	<p><b>Overview of Corporate Finance:</b> Objectives of Corporate Finance; Functions of Corporate Finance Investment Decision, Financing Decision, and Dividend Decision. Financial Ratio Analysis:</p> <p><b>Overview of Financial Statements:</b> 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</p>	08
03	<p><b>Concepts of Returns and Risks:</b> 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. 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.</p>	07
04	<p><b>Working Capital Management:</b> 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. 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).</p>	09
05	<p><b>Capital Structure:</b> 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</p>	08
	<b>Total</b>	39

### 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 I. 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 based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

### Continuous Assessment (B):

#### Theory:

1. Consisting **One Class Tests for 25 marks** based on approximately 50% of contents and one case study with presentations for 25 Marks.
2. Total duration allotted for writing test paper is 1 hr.
3. Average of the marks scored in the tests and case study will be considered for final grading.

Prepared by

Checked by

Head of the Department

Vice Principal

Principal



<b>Program: Final Year (Common for All Programs)</b>				<b>Semester: VIII</b>					
<b>Course: Logistics and Supply Chain Management</b>				<b>Course Code: DJ19ILO8026</b>					
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 2	Total
				75	25	25	25	100	
				Laboratory Examination			Term work		Total Term work
3	-	-	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
				-	-	-	-	-	-

**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.

**Outcomes:** On completion of the 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.

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
01	<p><b>Understanding the Supply Chain:</b> Objective, Importance, Decision Phases, Process Views.</p> <p><b>Achieving Strategic Fit and Scope:</b> Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope, Challenges to Achieving and Maintaining Strategic Fit.</p> <p><b>Supply Chain Drivers and Metrics:</b> Financial Measures of Performance, Drivers of Supply Chain Performance, Framework for Structuring Drivers, Facilities, Inventory, Transportation, Information, Sourcing, Pricing.</p>	08



	<p><b>Creating the Responsive Supply Chain:</b>          Product push versus demand pull, The Japanese philosophy, The foundations of agility, A route-map to responsiveness.</p>	
02	<p><b>Designing the Supply Chain and Transportation Networks</b>  <b>Designing Distribution Networks:</b>          The Role of Distribution in the Supply Chain, Factors Influencing Distribution Network Design, Design Options for a Distribution Network.  <b>Network Design in the Supply Chain:</b>          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.  <b>Designing Global Supply Chain Networks:</b>          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.  <b>Transportation in a Supply Chain:</b>          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.</p>	11
03	<p><b>Coordination in a Supply Chain:</b>          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.  <b>Sourcing Decisions in a Supply Chain:</b>          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.</p>	07
04	<p><b>Pricing and Revenue Management in a Supply Chain:</b>          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.  <b>Information Technology in a Supply Chain:</b>          The Role of IT in a Supply Chain, The 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.</p>	08
05	<p><b>Creating a Sustainable Supply Chain:</b>          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.  <b>Introduction to the Supply Chain of the Future:</b> Emerging Megatrends.</p>	05
	<b>Total</b>	39



## 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](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](https://onlinecourses.nptel.ac.in/noc21_mg12/preview)

### Evaluation Scheme:

#### Semester End Examination (A):

##### Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

#### Continuous Assessment (B):

##### Theory:

1. Consisting of **Two Compulsory Class Tests for 25 marks**, First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

Prepared by

Checked by

Head of the Department

Vice Principal

Principal



<b>Program: Final Year (Common for All Programs)</b>				<b>Semester :VIII</b>					
<b>Course : IPR and Patenting</b>				<b>Course Code: DJ19ILO8027</b>					
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 2	Total
				75			25	25	
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3				-	-	-	-	-	-

**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 the 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.

Detailed Syllabus: (unit wise)		
Unit	Description	Duration in hours
1	<b>Concept of Intellectual Property Law</b>  Idea/ Expression dichotomy, Introduction and the need for intellectual property right (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	6



	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	
<b>2</b>	<p><b>Patents and Trademarks</b></p> <p>Elements of Patentability: Novelty, Non-Obviousness, Industrial Application, Non-Patentable Subject Matter, Registration Procedure, Rights and Duties of Patentee, Assignment and License, Restoration of Lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies &amp; Penalties, Patent Office and Appellate Board, Case Study of Existing Patents related to software, healthcare, devices.</p> <p>Concept of Trademarks, Different Kinds of Marks: (Brand names, Logos, Signatures, Symbols, Well-known marks, Certification marks, Service marks), Non-Registrable Trademarks, Registration of Trademarks, Rights of Holder and Assignment and Licensing of Marks, Infringement, Remedies &amp; Penalties, Trademarks Registry and Appellate Board.</p>	11
<b>3</b>	<p><b>Copyrights and Design</b></p> <p>Copyrights: Nature, Subject Matter: original literary, dramatic, musical, artistic works, cinematograph films and sound recordings, Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright, Infringement, Remedies &amp; Penalties, Related Rights, Distinction between related rights and copyrights.</p> <p>Design: Meaning and concept of novel and original, Procedure for registration, Effect of registration and term of protection.</p>	9
<b>4</b>	<p><b>GI, PVP, and LDP</b></p> <p>Geographical Indication (GI): Meaning, difference between GI and trademarks, procedure for registration, effect of registration, and term of protection.</p> <p>Plant Variety Protection (PVP): Meaning, benefit sharing, farmers' rights, procedure for registration, effect of registration, and term of protection.</p> <p>Layout Design Protection (LDP): Meaning, procedure for registration, effect of registration, and term of protection.</p>	8
<b>5</b>	<p><b>Beyond IP</b></p> <p>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, Indian Competition Act and IPR protection, IPR issues in merger and acquisition, Harmonization of IP protection and competition Law in India</p>	5
	<b>Total</b>	39





## **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](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](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 based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.



***Continuous Assessment (B):***

***Theory:***

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average 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



<b>Program: Final Year (Common for All Programs)</b>				<b>Semester: VIII</b>					
<b>Course: Digital Marketing Management</b>				<b>Course Code: DJ19ILO8028</b>					
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 2	Total
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	-	-	3	-	-	-	-	-	-

**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.

**Outcomes:** Upon Completion of the course, the learner should 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.



<b>Detailed Syllabus (Unit wise)</b>		
<b>Unit</b>	<b>Description</b>	<b>Duration in Hours</b>
<b>1</b>	Emergence of Digital Marketing as a tool, media consumption drivers for new marketing environment, applications and benefits of digital marketing. Digital Marketing Framework Delivering enhanced customer value, market opportunity analysis and digital services development, ASCOR framework, critical success factors for digital marketing. Digital Marketing Models Creation Factors impacting digital marketplace, value chain digitization, business models. The Consumer for Digital Marketing Consumer behavior on the internet, evolution of consumer behavior models, managing consumer demand, integrated marketing communications (IMC), impact of digital channels on IMC	07
<b>2</b>	<b>Digital marketing Strategy Development</b> Elements of assessment phase, macro-micro environmental analysis, marketing situation analysis. <b>Digital Marketing Internal Assessment and Objectives Planning</b> Analyzing present offerings mix, marketing mix, core competencies analysis and internal resource mapping. Digital presence analysis, digital marketing objectives development and review. <b>Digital Marketing Strategy Definition</b> 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. <b>Digital marketing Strategy Roadmap</b> Developing digital marketing strategy roadmap, the 6s digital marketing implementation strategy, marketing across the product life cycle.	12
<b>3</b>	<b>Digital Marketing Planning and Setup</b> Understanding digital media planning terminology and stages, steps to creating marketing communications strategy, introduction to search marketing, display marketing, social media marketing. <b>Digital Marketing Operations Setup</b> Basics of lead generation and conversion marketing, website content development and management, elements of user experience, web usability and evaluation.	07
<b>4</b>	<b>Digital marketing Execution</b> Basic elements of digital campaign management, search execution, display execution, social media execution, content marketing. <b>Digital marketing Execution Elements</b> Digital revenue generation models, managing service delivery and payments, managing digital implementation challenges like e commerce, internal & external and consumer specific challenges.	08
<b>5</b>	<b>Digital Business - Present and Future</b> 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.	05
	<b>Total</b>	39



## **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 based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

### **Continuous Assessment (B):**

#### ***Theory:***

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average 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



<b>Program: Final Year (Common for All Programs)</b>				<b>Semester: VIII</b>					
<b>Course: Environmental Management</b>				<b>Course Code: DJ19ILO8029</b>					
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 2	Total
				75			25	25	25
				Laboratory Examination			Term work		Total Term work
				Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	
3	-	-	3	-	-	-	-	-	-

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

**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.

**Outcomes:** On completion of the 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.

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<b>Principles of Environmental management (EM):</b> Introduction of EM, Definition, Ecosystem concept, Participants in EM, Ethics and the environment, International Environmental Movement, Environmental issues relevant to India.	08
2	<b>Policy and Legal Aspects of EM:</b> Introduction to various Environmental Policies, Indian and International Environmental laws and legislation. EM system Standards: Core Elements, Benefits, Certification Body Assessment & Documentation for EMS, ISO-14000 Standards.	09
3	<b>Environmental Impact Assessment (EIA):-</b> 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	<b>Environmental Auditing (EA):-</b> Objectives, Scope and Types of EA, Audit Methodology, Elements of Audit Process, Auditing of EMS.	06
5	<b>Environmental Management Techniques:</b> Environmental Monitoring and Modelling, Environmental technology Assessment and Environmental Risk Assessment, Eco-mapping.	07
	<b>Total</b>	39

### 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

### Evaluation Scheme:

#### Semester End Examination (A):

##### *Theory:*

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

#### Continuous Assessment (B):

##### *Theory:*

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.



<b>Program: Final Year (Common for All Programs)</b>				<b>Semester: VIII</b>					
<b>Course: Labour and Corporate Law</b>				<b>Course Code: DJ19ILO8030</b>					
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 2	Total
				75	25	25	25	100	
				Laboratory Examination			Term work		Total Term work
3	-	-	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation / Journal	
				-	-	-	-	-	-

### 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.

**Outcomes:** On completion of the 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

Detailed Syllabus (Unit wise)		
Unit	Description	Duration in Hours
1	<b>Trade Unions and Collective Bargaining:</b> 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	09
2	<b>Industrial Dispute and Instruments of Economic Coercion:</b> 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	08





<b>3</b>	<b>Formation of a Company and Corporate governance:</b> Company and Other Forms of Business Organizations, Different Kinds of Company: One Person Company, Foreign Company. Kinds of Company Meetings and Procedure Powers, Duties and Kinds of Director: Independent Director, Women Director Different Prevention of Oppression and Mismanagement Investor Protection, Insider Trading, Corporate Fraud.	08
<b>4</b>	<b>Corporate Social Responsibility and Corporate Liquidation:</b> 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
<b>5</b>	Case Studies on A) Labour law B) Labour relations C) Corporate laws D) Securities laws	08
	<b>Total</b>	<b>39</b>

### 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 Kluwer 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:*

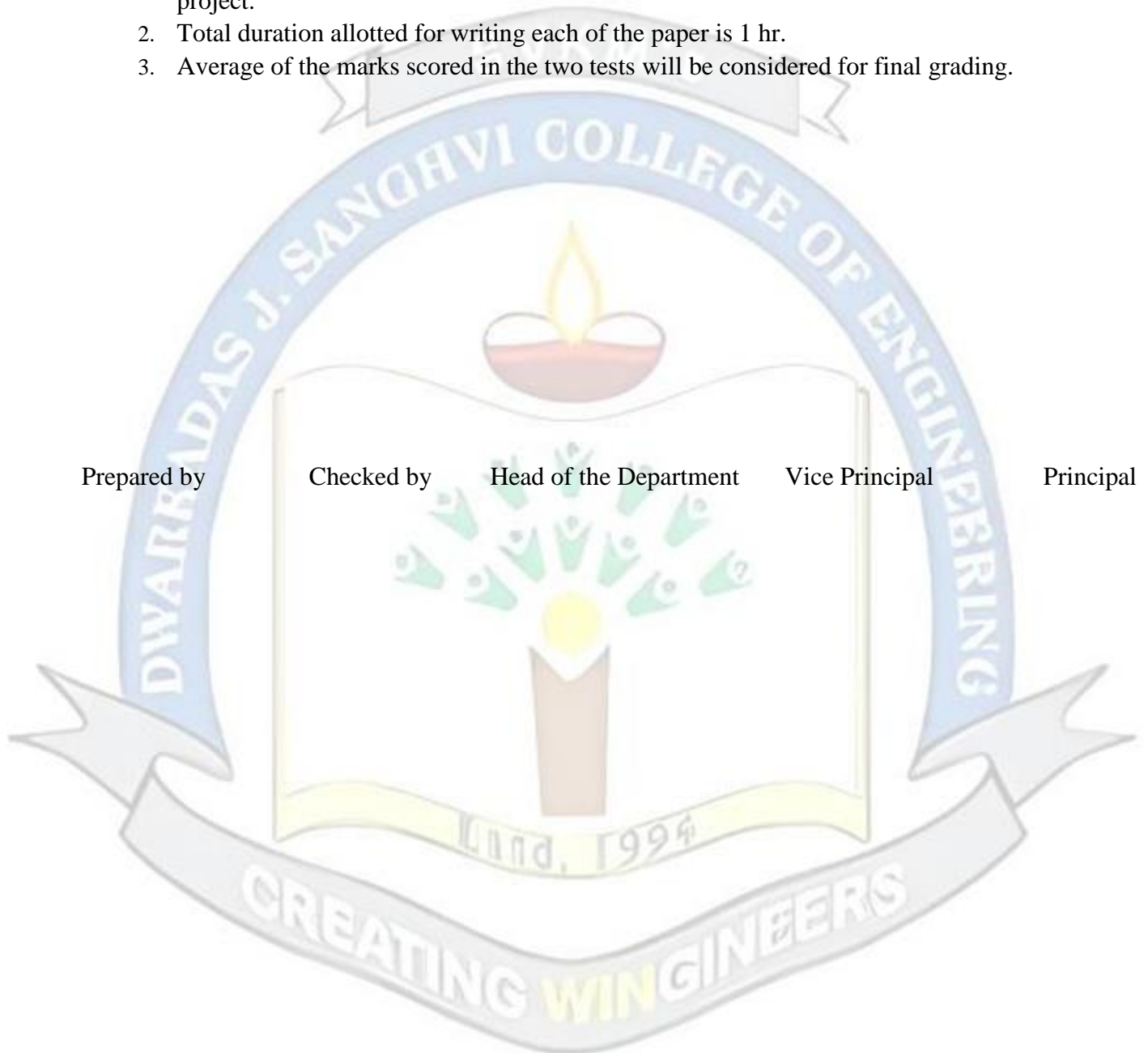
1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.



**Continuous Assessment (B):**

*Theory:*

1. Two term tests of 25 marks each will be conducted during the semester, out of which one will be a compulsory term test (on minimum 02 Modules) and the other can either be a termtest or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in the two tests will be considered for final grading.



Prepared by

Checked by

Head of the Department

Vice Principal

Principal



<b>Program: Artificial Intelligence &amp; Machine Learning</b>	<b>B.Tech</b>	<b>Semester: VIII</b>
<b>Course: Project-II (DJ19AMP803)</b>		

**Course Objectives:** To introduce the students to professional engineering practice by providing them with an opportunity to work on an open-ended engineering problem. Typically, the students would apply knowledge from different areas or courses, which they have studied in their curriculum using methods, tools, and techniques, which they learned to a real-world scenario. Students would have to apply not only their engineering knowledge and proficiencies (hard skills), but also to demonstrate their competence in generic, professional skills (soft skills). It also emphasizes the importance of life-long learning as a fundamental attribute of graduate engineers.

**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) or file a patent.