Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and Detailed Syllabus of DJS22

Sem VIII

Revision: 2025

With effect from the Academic Year: 2025-2026

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

Proposed Scheme for Final Year Undergraduate Program in Artificial Intelligence and Machine Learning: Semester VIII (Autonomous)
Academic Year(2025-26)

	Sr. No.	Course Code	Course	Teaching Scheme					Semester End Examination (A)					Continuous Assessment (B)					Aggregate (A+B)	Credits
				Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Credits	Duration	Theory	Oral	Pract	Oral & Pract	SEE Total(A)	Term Test 1 (TT1)	Term Test 2 (TT2)	Term Test Total (TT1 + TT2)	Term work	CA Total (B)		
PC	1	DJS22AMC801	Reinforcement and Federated Learning	3	--	--	3	2	65	--	--	--	65	20	15	35	--	35	100	4
		DJS22AML801	Reinforcement and Federated Learning Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	
	2	DJS22AMC802	Responsible AI	3	--	--	3	2	65	--	--	--	65	20	15	35	--	35	100	4
		DJS22AML802	Responsible AI Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	
DLO	3@	DJS22AMC8011	AI in Healthcare	3	--	--	3	2	65	--	--	--	65	20	15	35	--	35	100	4
		DJS22AML8011	AI in Healthcare Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	
		DJS22AMC8012	Quantum Computing	3	--	--	3	2	65	--	--	--	65	20	15	35	--	35	100	4
		DJS22AML8012	Quantum Computing Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	
		DJS22AMC8013	Image Generative AI	3	--	--	3	2	65	--	--	--	65	20	15	35	--	35	100	4
		DJS22AML8013	Image Generative AI Laboratory	--	2	--	1	2	--	25	--	--	25	--	--	--	25	25	50	
ILE	4#	DJS22ILO8021	Project Management	3	--	--	3	2	65	--	--	--	65	20	15	35	--	35	100	3
		DJS22ILO8022	Entrepreneurship Development and Management																	
		DJS22ILO8023	Corporate Social Responsibility																	
		DJS22ILO8024	Human Resource Management																	
		DJS22ILO8025	Corporate Finance Management																	
		DJS22ILO8026	Logistics and Supply Chain Management																	
		DJS22ILO8027	IPR and Patenting																	
		DJS22ILO8028	Digital Marketing Management																	
		DJS22ILO8029	Environmental Management																	
		DJS22ILO8030	Labour and Corporate Law																	
CC	5	DJS22AMP803	Project Stage II	--	10	--	5	2	--	--	--	100	100	--	--	--	100	100	200	5
Total				12	16	--	20	20	260	75	--	100	435	80	60	140	175	315	750	20

@ Department Level Elective

Institute level Elective

CC-Common Courses

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Continuous Assessment (A):

Course	Assessment Tools	Marks	Time (hrs.)
Theory	One Term test (based on 40 % syllabus)	20	1
	Second Term test (next 40 % syllabus) / presentation / assignment / course project / group discussion / any other.	15	
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.	65	2
	* 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

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Program: Artificial Intelligence & Machine Learning	B. Tech.	Semester: VIII
Course: Reinforcement and Federated Learning (DJS22AMC801)		
Course: Reinforcement and Federated Learning Laboratory (DJS22AML801)		

Prerequisite: Machine Learning, Knowledge of Probability, Linear Algebra, and Calculus, Python programming and deep learning frameworks (TensorFlow / PyTorch).

Course Objectives:

To provide a comprehensive understanding of Reinforcement Learning (RL) principles, algorithms, and applications, including multi-armed bandits, dynamic programming, temporal difference learning, and deep RL. Students will acquire practical skills in model-free and model-based RL, policy evaluation, and function approximation using neural networks. The course covers real-world applications in robotics, gaming, recommender systems, and industry. It also introduces Federated Learning (FL) fundamentals for privacy-preserving distributed learning. Learners will explore the integration of RL and FL in practical scenarios.

Course Outcomes: Students will be able to:

1. Explain the fundamental concepts of reinforcement learning, including agents, environments, rewards, policies, and the mathematical foundations such as value functions and Bellman equations.
2. Formulate and solve Markov Decision Processes (MDPs) and multi-armed bandit problems using dynamic programming, Monte Carlo methods, and temporal difference learning.
3. Implement deep reinforcement learning algorithms, including Deep Q-Networks (DQN) and Policy Gradient methods, for practical problems in games, robotics, and industrial applications.
4. Understand the principles of federated learning, including FedAvg, privacy mechanisms, and communication challenges, and analyze potential applications in healthcare, finance, and personalized AI systems.

Reinforcement and Federated Learning (DJS22AMC801)		
Unit	**Description**	**Duration**
1	**Introduction to Reinforcement Learning**: Introduction to reinforcement learning. RL Elements: Agent, Environment, Rewards, States, Actions, Policy, History and applications (Games, Robotics, Recommenders, Industry). Mathematical foundations: Rewards, returns, discounting, Value functions (V and Q), Bellman equations, Markov Decision Processes (MDPs): States, actions, transitions, rewards, Episodic vs continuing tasks, Difference between Immediate and Full Reinforcement Learning,	7
2	**Bandit Problems**: k-armed bandit, Stochastic rewards, Action-value methods, Exploration vs Exploitation, Bandit Algorithms: ε-greedy method, Optimistic initial values, Softmax / Boltzmann exploration, Upper Confidence Bound (UCB),Thompson Sampling Relationship	7

	between MAB and RL Non-stationary bandits, Real-world applications: Online advertising: A/B testing, Recommendation systems, Clinical trials.	
3	**Dynamic Programming & Planning:** Model-based RL, Policy evaluation, Policy improvement, Policy iteration, Value iteration, Generalized Policy Iteration (GPI), Convergence issues, Applications: Gridworld, path planning.	7
4	**Model-Free Prediction & Control**: Monte Carlo Methods, Monte Carlo prediction, First-visit vs every-visit MC, Monte Carlo control, Exploring Starts, Off-policy MC & importance sampling, Temporal Difference Methods:TD(0) prediction, SARSA (on-policy control), Q-Learning (off-policy control), Expected SARSA, Advanced TD Methods, n-step bootstrapping, Eligibility traces, TD(λ).	7
5	**Deep Reinforcement Learning:** Function approximation, Deep neural networks for RL, Deep Q-Network (DQN), Experience replay, Target networks, Variants: Double DQN, Dueling DQN (optional), Policy Gradient Methods: REINFORCE algorithm, Actor-Critic Methods, Case studies: Atari games, CartPole, Robotics control & navigation, Samuel's Checkers Player, Dynamic Channel Allocation, Job-Shop Scheduling.	7
6	**Federated Learning Fundamentals, Privacy & Applications**: Motivation for Federated Learning, FL architecture: Clients, server, communication cycles, Federated Averaging (FedAvg) algorithm, Data heterogeneity & communication challenges, Differential privacy, Secure aggregation, Adversarial attacks & model poisoning Benchmark frameworks: TensorFlow Federated, PySyft, Flower, Applications: Healthcare, Finance, Personalized AI, (Optional) RL + FL combined applications.	7
	TOTAL	**42**

Books Recommended:

Text books:

1. Soumyadip Sarkar" An Introduction to Reinforcement Learning" Notion Press, 2025
2. Saravanan Krishnan, A. Jose Anand, R. Srinivasan, R. Kavitha, S. Suresh, "Handbook on Federated Learning: Advances, Applications and Opportunities", CRC Pr I Llc, 2025.
3. Milad Farsi, Jun Liu, Maria Domenica Di Benedetto, " Model-Based Reinforcement Learning: From Data to Continuous Actions with a Python-based Toolbox (IEEE Press Series on Control Systems Theory and Applications)", Wiley-IEEE Press, 2022
4. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning: An Introduction", MIT Press, 2nd Edition, 2020.
5. Laura Graesser Wah Loon Keng, "Foundations of Deep Reinforcement Learning," Pearson Education, 1st, Edition, 2020.

Reference Books:

1. Marcus C Lauritsen "Reinforcement Learning for Beginners: A Step-by-Step Guide to Training Smart AI Agents", Independently Published, 2025.
2. Qiang Yang , Yang Liu, "Federated Learning", Springer / BSP Books, 1st Edition, 2025.
3. George Jeno, "Federated Learning with Python: Design and implement a federated learning system and develop applications using existing frameworks" Packt Publishing, 1st Edition, 2022.
4. Phil Winder, "Reinforcement Learning Industrial Applications of Intelligent Agents", O'Reilly, 1st Edition, 2020.
5. Csaba Szepesvari, "Algorithms for Reinforcement Learning," Morgan & Claypool Publishers, 1st Edition, 2019.
6. Enes Bilgin, "Mastering Reinforcement Learning with Python", Packt publication, 1st Edition, 2020.
7. Brandon Brown, Alexander Zai, "Deep Reinforcement Learning in Action", Manning Publications, 1st, Edition, 2020.
8. Micheal Lanham, "Hands-On Reinforcement Learning for Games," Packt Publishing, 1st Edition, 2020.
9. Abhishek Nandy, Manisha Biswas, "Reinforcement Learning: With Open AI, TensorFlow and Keras using Python," Apress, 1st Edition, 2018.

Web Links:

1. NPTEL Course in Reinforcement Learning: 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
5. TensorFlow Federated documentation: https://www.tensorflow.org/federated
6. OpenAI Gym documentation: https://gym.openai.com
7. Federated Learning What Is Federated Learning? | IBM
8. Federated Learning https://blogs.nvidia.com/blog/what-is-federated-learning/
9. Federated Learning 8 Innovative applications of federated learning across the globe - OpenSistemas

Reinforcement and Federated Learning Laboratory (DJS22AML801)	
Sr. No	**List of Suggested Experiments**
1	Interacting with an OpenAI Gym Environment (CartPole-v1).
2	Simulate and Model a simple environment (e.g., Gridworld or FrozenLake) as a Markov Decision Process (MDP) by Defining States, Actions, Transitions, and Rewards.
3	Implement a simple MDP and visualize transitions. (Python, Matplotlib)
4	Implement iterative policy evaluation using Bellman expectation equations. (Python, Numpy)

5	Implement Monte Carlo Prediction and Control for a small environment.
6	Implement TD Learning (SARSA and Q-Learning) on a GridWorld environment.
7	Comparison of On-policy and Off-policy learning methods: CliffWalking-v0.
8	Develop a Deep Q-Network (DQN) using PyTorch/TensorFlow CartPole-v1.
9	Implement Policy Gradient and REINFORCE algorithm.
10	Actor–Critic model implementation on a continuous control problem.
11	Introduction to Federated Learning framework (TensorFlow Federated / PySyft).
12	Use federated transfer learning when clients have different feature spaces or label spaces using PyTorch/TensorFlow, heterogeneous datasets (e.g., MNIST & SVHN or image + tabular splits)
13	Implement Federated Averaging (FedAvg) algorithm for MNIST dataset.
14	Evaluate privacy-preserving mechanisms (Differential Privacy in FL).

Minimum ten 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 | HoD | Vice-Principal | Principal

Program: Artificial Intelligence & Machine Learning	B.Tech.	Semester: VIII
Course: Responsible AI (DJS22AMC802)		
Course: Responsible AI Laboratory (DJS22AML802)		

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.

Responsible AI (DJS22AMC802)		
Unit	**Description**	**Duration**
1	**Introduction:** 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	06
2	**Bias and Fairness:** Sources of Biases, Techniques for detecting, mitigating, and preventing bias in data and models, limitation of a dataset, Preprocessing, in-processing and post-processing to remove bias, Fairness of classification algorithms: Handling Disparate Treatment/Disparate Impact, Fair Embedding's, Counterfactual fairness,	08
3	**Governance of AI:** Role of government, academia, and industry in ethical AI development, Integrity, Transparency, Accountability, Fairness, Control, Sustainability, Democracy, Interoperability, Spread of hate content, Countering hate speech, The future of AI and its impact on humanity.	08

4	**Transparency and Explainability in AI:** 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)	07
5	**Data ownership, Privacy and Anonymity:** 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	06
6	**AI standards and Regulation:** 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	07
	TOTAL	**42**

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 Ediiton, 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/
6. https://artificialintelligenceact.eu/the-act/

Suggested List of Experiments:

Responsible AI Laboratory (DJS22AML802)	
Sr. No.	**Title of the Experiment**
1	Perform EDA to figure out missing data.
2	Perform LIME - Local Interpretable Model-Agnostic Explanations.
3	Implement Detect and mitigate age bias in predictions.
4	Implement Meta-Algorithm for fair classification .
5	Implement Discover, Measure, and Mitigate Bias in Advertising.
6	Implementing a simple white-box attack using the Privacy Meter.
7	Analyze Privacy Meter by executing a population attack on the CIFAR10 dataset.
8	Research and analyze recent data privacy violations and their impact on individuals and society.
9	Identification On Optimization in AI Affecting Ethics
10	Identify and mitigate gender bias present in NLP text classification models.
11	Compare Fairness Metrics Across Model Algorithms
12	Investigate Explainability Using SHAP for Complex Black Box Models
13	Differential Privacy Implementation in Model Training
14	Assess AI-Driven Surveillance and Ethical Implications

Minimum ten 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 HoD Vice-Principal Principal

Program: Artificial Intelligence & Machine Learning	B.Tech.	Semester: VIII
Course: AI in Healthcare (DJS22AMC8011)		
Course: AI in Healthcare Laboratory (DJS22AML8011)		

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. Identify and evaluate various types of healthcare data (e.g., EHR, medical imaging, genomic data) and assess challenges like data privacy, bias, and regulatory constraints.
2. Implement machine learning algorithms (classification, clustering, time-series analysis) for predictive analytics, diagnostics, and clinical decision support systems using healthcare datasets.
3. Design and implement deep learning architectures (CNNs, RNNs) for medical image classification, segmentation, and time-series health data analysis, enhancing diagnostic accuracy.
4. Use AI tools to aid in drug discovery and optimize personalized medicine approaches by analyzing genomic data and predicting patient responses to treatments.
5. Discuss and address ethical challenges, privacy issues, and the legal framework surrounding the deployment of AI systems in clinical settings.

AI in Healthcare (DJS22AMC8011)		
Unit	**Description**	**Duration**
1	**Introduction to AI in Healthcare:** Overview of AI in Healthcare: Historical perspective, Types of AI systems in healthcare, Role of AI in healthcare transformation. Key Healthcare Domains for AI Applications: Medical imaging, Diagnostics, Drug discovery, Personalized medicine. Challenges in Healthcare Data: Data	06

	variability, noise, and incompleteness, Data privacy and security concerns, Regulatory constraints.	
2	**Machine Learning in Healthcare:** Introduction to Healthcare Data: Electronic Health Records (EHR), Medical imaging data (X-rays, MRIs, CT scans), Genomics and clinical trial data. Machine Learning Techniques: Classification and regression for disease prediction, Clustering for patient stratification, Time series analysis for health monitoring. **Use cases**: Predictive analytics, clinical decision support systems	08
3	**Deep Learning in Healthcare:** Introduction to Deep Learning Architectures: Convolutional Neural Networks (CNNs) for medical imaging, Recurrent Neural Networks (RNNs) for time-series health data, Auto encoders for anomaly detection. Applications in Medical Imaging: Image classification, segmentation, and detection in radiology. Natural Language Processing (NLP) in Healthcare: Information extraction from medical literature and EHRs, NLP applications: Chatbots, virtual assistants, voice recognitions. **Introduction to Federated Learning in Healthcare data**	08
4	**AI in Drug Discovery and Personalized Medicine:** AI-Driven Drug Discovery: Introduction to computational drug discovery and AI Case studies: AI in accelerating drug development. AI for Personalized Medicine: AI-based genomic analysis, Predicting patient responses to therapies, Tailoring treatment plans using AI models.	08
5	**AI Ethics, Privacy, and Regulations in Healthcare:** Ethical Considerations in AI for Healthcare: Bias in AI models and its implications, AI decision-making in healthcare. Privacy and Security in Healthcare AI: Handling sensitive healthcare data, Regulations: HIPAA, GDPR, and their implications for AI. Regulatory Aspects and AI Approval: AI in clinical trials and FDA approvals.	07
6	**Emerging Trends of AI in Healthcare:** Wearable AI and Remote Monitoring: AI for patient monitoring using IoT and wearables. AI in Robotics and Surgery: AI-assisted surgeries, robotic platforms, and automation. Telemedicine and AI Integration: AI-driven remote consultations and diagnostics.	05
	TOTAL	42

Books Recommended:

Test Books:

1. Bohr, A., & Memarzadeh, K. (2020). *Artificial intelligence in healthcare*. ScienceDirect / Academic Press.

2. Yang, H., & Lee, E. K. (2016). *Healthcare analytics: From data to knowledge to healthcare improvement*. Wiley.

3. Zhou, S. K., Greenspan, H., & Shen, D. (2017). *Deep learning for medical image analysis*. Academic Press.

Reference Books:

1. Floridi, L., & Taddeo, M. (Eds.). (2021). *Ethics of artificial intelligence in healthcare*. Springer / ACM.
2. Topol, E. (2019). Deep medicine: How artificial intelligence can make healthcare human again.
3. Frangi, A. F., et al. (2023). Medical image analysis. Elsevier.

Research Papers

1. Rieke, N., Hancox, J., Li, W., Milletari, F., Roth, H. R., Albarqouni, S., … & Cardoso, M. J. (2020). The future of digital health with federated learning.

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:

AI in Healthcare Laboratory (DJS22AML8011)	
Sr. No.	**Title of the Experiment**
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	Use social media, clinical reports, and mobility data to predict disease outbreaks.
13	Review of Research Articles
14	Case Study: Medical Regulations and Compliances

Minimum ten 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 | HoD | Vice-Principal | Principal

Program: Artificial Intelligence & Machine Learning	B.Tech.	Semester: VIII
Course: Quantum Computing (DJS22AMC8012)		
Course: Quantum Computing Laboratory (DJS22AML8012)		

Prerequisite: Statistics for Data Science, and Machine Learning – I.

Course Objectives:

To equip students with foundational and practical knowledge of quantum computing, enabling them to understand quantum principles, analyze quantum algorithms, and apply quantum tools for solving computational problems.

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

1. Explain the basic principles and mathematical foundations of quantum computing including qubits, superposition, and entanglement.
2. Analyze and construct quantum circuits for various quantum operations.
3. Demonstrate applications of key quantum algorithms such as Deutsch-Jozsa, Grover's, and Shor's.
4. Apply quantum cryptographic protocols like BB84 and analyze their security features.
5. Evaluate the effects of quantum error correction and noise models in computations.
6. Use industry-standard quantum programming platforms (e.g., Qiskit) to design, simulate, and test quantum algorithms.

Quantum Computing (DJS22AMC8012)		
Unit	**Description**	**Duration**
1	**Mathematical and Physical Foundations:** Linear algebra: vectors, matrices, complex numbers, tensor product, Probability theory: basics, random variables, Quantum mechanics: states, postulates, Hilbert space formalism, Dirac notation, Superposition, measurements, evolution (unitary operators), The Bloch sphere: geometric representation of qubits. Quantum time evolution, Schrödinger equation, von Neumann entropy	06
2	**Qubits and Multi-Qubit Systems:** Single qubit systems: X, Y, Z, Hadamard, Rotation, Phase gates, Multi-qubit systems: tensor products, CNOT, SWAP, Toffoli gates. State representations and matrix forms, No-cloning theorem, Bell states, entanglement, EPR pairs, Schmidt decomposition.	07
3	**Quantum Circuits and Computation** Quantum Boolean circuits, quantum circuit model, Church-Turing hypothesis (quantum extensions), Circuit universality, Solovay-Kitaev theorem, circuit complexity, Bloch sphere operations, circuit optimization.	07
4	**Quantum Algorithms:**	08

	Quantum oracles and query models, Deutsch's Algorithm, Deutsch-Jozsa Algorithm., Bernstein-Vazirani and Simon's algorithms, Phase estimation, Quantum Fourier Transform. Applications: order-finding, period-finding, Shor's algorithm (quantum factoring), Grover's Algorithm: unstructured search and amplitude amplification, quantum walks, Optimality proofs for algorithms.	
5	**Quantum Cryptography and Communication:** Quantum key distribution (BB84 protocol), Superdense coding, quantum teleportation, Physical realizations of qubits (superconducting, trapped ions, photonic), Basics of quantum networks and communication.	07
6	**Complexity, Error Correction, and Advanced Topics** Quantum complexity classes: BQP, relationship to classical P/NP/EXP, Lower bounds and quantum query complexity (adversary, polynomial methods), Quantum error correction: Shor code, Steane code, syndrome measurement, fault tolerance, NISQ computing, noise models, error mitigation., Variational quantum algorithms (VQE, QAOA), quantum machine learning (introductory topics), Applications: Quantum annealing, optimization, chemistry, and artificial intelligence.	07
	TOTAL	**42**

Books Recommended:

Textbooks:

1. Ivan B. Djordjevic, Quantum Information Processing, Quantum Computing and Quantum Error Correction: An Engineering Approach, 2nd Edition, Elsevier (Academic Press), 2021.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, An Introduction to Quantum Computing, Oxford University Press, 2007

Reference Books:

1. Michael A. Nielsen and Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 2000
2. Parag Lala, Quantum Computing", McGraw Hill India, 2020
3. Eleanor Rieffel, Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011

Web Links:

1. Web resources:

IBM Quantum Learning: https://quantum.cloud.ibm.com/learning

MIT xPRO Quantum Computing Fundamentals: https://learn-xpro.mit.edu/quantum-computing

2. Online Courses: NPTEL / Swayam :

1. Introduction to Quantum Computing course: https://onlinecourses.nptel.ac.in/noc25_cs95/preview .
2. Coursera Quantum Computing course: https://www.coursera.org/learn/quantum-computing

List of Experiments:

Quantum Computing Laboratory (DJS22AML8012)	
Sr. No.	**Title of the Experiment**
1	Prepare single and multi-qubit quantum states (superposition, entangled states, Bell states).
2	Visualizing qubit and multi-qubit states on the Bloch sphere . Observing the effects of various quantum gates on qubits.
3	Implementation and experimental testing of basic gates (Pauli-X, Y, Z, Hadamard, Phase, CNOT, Toffoli, SWAP).
4	Deutsch and Deutsch-Jozsa algorithms: distinguishing between constant and balanced functions.
5	Grover's search algorithm: amplitude amplification and unstructured search.
6	Simon's algorithm: finding a secret string with exponential speedup.
7	Shor's algorithm (simulation): factoring small integers.
8	Preparation, measurement, and verification of Bell states and entanglement.
9	Assignments on BB84 quantum key distribution protocol. Analysis of quantum eavesdropping and protocol robustness.
10	Implementation of three-qubit bit-flip and phase-flip error correction codes.
11	Implement and benchmark quantum key distribution protocols (BB84, E91) on quantum networks to advance secure access for underserved populations. (SDG-9).
12	Implement and compare quantum support vector machines (QSVM) or quantum k-nearest neighbors (QkNN).
13	Demonstrate quantum teleportation across chained entangled qubit pairs or quantum repeater simulation.
14	Compare performance of different quantum compiler tools (Qiskit, Cirq, PennyLane) on non-trivial circuits.

Batch wise laboratory work of minimum ten 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

Program: Artificial Intelligence & Machine Learning	B.Tech.	Semester: VIII
Course: Image Generative AI (DJS22AMC8013)		
Course: Image Generative AI Laboratory (DJS22AML8013)		

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 applications of Image Generation
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.
4. Understand and apply techniques for video generation

Image Generative AI (DJS22AMC8013)		
Unit	**Description**	**Duration**
1	**Introduction and Applications of Image Generation:** 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, Overview of Generative Model Families: Likelihood-based, Implicit, Diffusion, and Energy-based models, Evaluation Metrics for Generated Images : FID, PSNR, SSIM	7
2	**Generative Adversarial Networks (GANs) and Variants:** Architecture of GANs: Generator and Discriminator, Adversarial Training, Variants of GANs (e.g., DCGAN, StyleGAN), BigGAN, Pix2Pix, GauGAN	7
3	**Generative and Representation Learning Architectures for Images** Introduction to Variational Autoencoders (VAEs), -Variational inference and reparameterization trick. Conditional VAEs (CVAE), Vector Quantized VAE	7

	(VQ-VAE, VQ-VAE-2). **Representation Learning Architectures :**Neural Style Transfer (NST), Siamese Networks and UNET Architecture	
4	**Diffusion Models and Modern Image Generation:** Introduction to Diffusion Models, Concepts and architecture overview , De-noising Diffusion Probabilistic Model, Stochastic Differential Equation (SDE), Diffusion Probabilistic Models: Concept & Architecture (DALL-E, Stable Diffusion,Imagen), Comparison: GANs vs VAEs vs Diffusion Models, Hybrid Diffusion Techniques: Latent Diffusion, VQ-Diffusion. Flow based models, ControlNet.	8
5	**Vision Language Models and Image Generation:** Introduction to Vision Language Models (VLMs), Transformer-Based Captioning Models :Contrastive Language Image Pairs (CLIP), Vision-and-Language Transformer(ViLT), DeepSeek-VL2, Gemma 3.	8
6	**Video Generation Models:** Video GAN (VGAN) , MoCoGAN: Decomposing Motion and Content for Video Generation, Video Diffusion Models : TATS (Text-to-Video via Diffusion) model, Video LDM (High-Resolution Video Synthesis with Latent Diffusion Models)	6
	TOTAL	42

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/
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:

Image Generative AI Laboratory (DJS22AML8013)	
Sr. No.	**Title of the Experiment**
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	Create and evaluate a hybrid model using VQ-VAE-2 and diffusion techniques.
8	Analyze the architecture of a diffusion model (e.g., DALL-E, stable diffusion) and generate images using available pre-trained models.
9	Explore the application of transformers in image generation and implement a basic transformer model for image tasks.
10	Utilize CLIP to generate text-image pairs and evaluate their relevance and accuracy.
11	Train a U-Net for semantic segmentation on a medical or natural image dataset. Also show how U-Net encoder features can be used for representation learning (e.g., feature extraction for classification).
12	Compare Transformer captioners (ViLT) vs. CLIP-guided prefix tuning vs. Gemma-style multimodal decoder. Evaluate how (a) direct vision-language transformers

	(ViLT), (b) contrastive CLIP features + small prefix-tuned decoder, and (c) a modern multimodal decoder (Gemma-style) perform on image captioning.
13	Classic Video GANs: Compare VGAN vs MoCoGAN for short action clips (decomposing motion & content) Implement and compare VideoGAN (VGAN) and MoCoGAN on generating short (1–3s) synthetic videos conditioned on action labels; emphasize decomposition into content and motion latent factors.
14	Create a project that showcases the interaction between text and images, evaluating the generated outcomes.

Minimum Ten 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.

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Project Management (DJS22ILO8021)		

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 the project management life cycle and the various project phases, as well as the role of the 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 the Earned Value technique and determine & predict the status of the project.
5. Capture lessons learned during project phases and document them for future reference.

Project Management (DJS22ILO8021)		
Unit	**Description**	**Duration**
1	**Project Management Foundation:** Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical & atypical), Project phases and stage gate process. Role of project manager, Negotiations and resolving conflicts, Introduction to project leadership, ethics in projects, Multicultural and virtual projects, Project management in various organizational structures, PM knowledge areas as per the Project Management Institute (PMI).	8
2	**Initiating Projects:** How to get a project started, selecting a project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating a charter, Effective project team, Stages of team development & growth (forming, storming, norming & performing), team dynamics.	8
3	**Project Planning:** Work Breakdown Structure (WBS) and linear responsibility chart, Project cost estimation and budgeting, top-down and bottom-up budgeting. Networking and Scheduling techniques, PERT, CPM, Crashing project time, Resource loading and levelling, Goldratt's critical chain, GANTT chart, Project Stakeholders and Communication plan, Introduction to Project Management Information System (PMIS). Risk Management in projects: Risk management planning, Risk identification and risk register, Qualitative and quantitative risk assessment, Probability and impact matrix. Risk response strategies for positive and negative risks.	10
4	**Monitoring and Controlling Projects:** Planning, monitoring, and controlling cycle, Information needs and reporting, engaging all stakeholders of the projects, communication, and project meetings. With Earned Value Management techniques for measuring the value of work completed, using milestones for measurement, change requests, and scope creep, Project audit. Project Contracting Project procurement management, contracting and outsourcing.	8
5	**Closing the Project:** Customer acceptance, Reasons of project termination, Various	8

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	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.	
	Total	**42**

Books Recommended:

Text books:

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

Reference Books:

- A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 5th Ed. Project
- Management Institute PA, USA.
- Project Management, Gido Clements, Cengage Learning.
- Project Management, Gopalan, Wiley India.
- Project Management, Dennis Lock, 9th Edition, Gower Publishing England.

Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Entrepreneurship Development and Management (DJS22ILO8022)		

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 make the right decisions for.

Outcomes: On completion of the course, learners 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 a suitable MSME scheme for an entrepreneur
5. Interpret the financial and legal aspects of a business.

Entrepreneurship Development and Management (DJS22ILO8022)		
Unit	**Description**	**Duration**
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 the entrepreneurial process: Develop idea generation, creative, and innovative skills	**08**
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	**Institutions Supporting Entrepreneurs:** Small industry financing in developing countries, A brief overview of financial institutions in India, Central level and state level institutions - SIDBI-NABARD-IDBI-SIDCO, Indian Institute of Entrepreneurship System. District Industries Centers - Single Window	**08**
4	**Micro, Small, and Medium Enterprises (MSMES):** MSMEs - Definition and Significance in Indian Economy; MSME Schemes, Challenges and Difficulties in availing MSME Schemes, Forms of Business; Make-In India, Start-Up India, Stand-Up India. Women Entrepreneurship; Rural Entrepreneurship; Family Business and First-Generation Entrepreneurs	**09**
5	**Finance, Accounting, Costing, and Legal Aspects of Business:** Funding new ventures: Conventional Source of Finance, bootstrapping, crowd sourcing- angel investors, VCs, debt financing, due diligence, Legal aspects of business (IPR, GST, Labour law)- Cost, volume, profit, and break-even analysis - Margin of safety and the degree of operating leverage. Capital budgeting for comparing projects or opportunities, Product costing- Product pricing- Introduction to financial statements - Profit & Loss statement, Balance sheet - Cash flow-Closure of Business	**09**
	Total	**42**

Books Recommended:

Reference Books:

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

Parvati B

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Corporate Social Responsibility (DJS22ILO8023)		

Objectives:

1. To make students understand the concept, theories, and application of CSR for the Development of Society.

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

1. Understand the key characteristics of Corporate Social Responsibility (CSR) in the context of present-day management.
2. Apprise regarding business decision-making, which is informed by ethical values and respect for people, communities, and the environment.
3. Become aware of creating a strategic plan that enables an organization to reach out to its internal and external stakeholders with consistent messages.
4. Understand critical issues of Corporate Social Responsibility (CSR) in a cross-cultural setting.

Corporate Social Responsibility (DJS22ILO8023)		
Unit	**Description**	**Duration**
1	**Introduction to CSR** Meaning and Definition, History of CSR, Concepts of Charity, Corporate Philanthropy, Corporate Citizenship, Sustainability, and Stakeholder Management. Environmental aspects of CSR, Chronological evolution, and Models of CSR in India, including Carroll's model and major codes on CSR Initiatives in India.	09
2	**International Framework for Corporate Social Responsibility** Millennium Development Goals, Sustainable Development Goals, Relationship between CSR and MDGs. United Nations (UN) Global Compact 2011. UN guiding principles on business and human rights. OECD CSR policy tool, ILO Tripartite Declaration of Principles on Multinational Enterprises and Social Policy.	09
3	**CSR-Legislation in India and the World** Section 135 of the Companies Act 2013.Scope for CSR Activities under Schedule VII, Appointment of Independent Directors on the Board, and the Implementation of the Computation of Net Profit in India.	08
4	**The Drivers of CSR in India** 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
5	**Identifying key stakeholders of CSR** 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 the Govt. of India, and Roles and responsibilities of corporate foundations.	08
	Total	42

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Books Recommended:

Textbooks:

- Corporate Social Responsibility in India, Sanjay K Agarwal, Sage Publications, 2008.
- Corporate Social Responsibility in India, Bidyut Chakrabarty, Routledge, New Delhi, 2015.

Reference Books:

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

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Human Resource Management (DJS22ILO8024)		

Objectives:

1. To introduce the students to basic concepts, techniques, and practices of human resource management.
2. To provide an opportunity of learning Human Resource Management (HRM) processes, related to the functions, and challenges in the emerging perspective of today's organizations.
3. To familiarize the students with 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, the learner will be able to:

1. Understand the concepts, aspects, techniques, and practices of human resource management.
2. Understand the Human Resource Management (HRM) processes, functions, changes, and challenges in today's emerging organizational perspective.
3. Gain knowledge about the latest developments and trends in HRM.
4. Apply the knowledge of behavioral skills learnt and integrate it with interpersonal and intergroup environments, emerging as future stable engineers and managers.

Human Resource Management (DJS22ILO8024)		
Unit	**Description**	**Duration**
1	**Introduction to HR** Human Resource Management- Concept, Scope, and Importance, Interdisciplinary Approach Relationship with other Sciences, Competencies of HR Manager, HRM functions. Human resource development (HRD): changing role of HRM, Human resource Planning, Technological change, Restructuring, and rightsizing. Empowerment, TQM, and Managing ethical issues.	08
2	**Organizational Behaviour (OB)** 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.	10
3	**Organizational Structure & Design** 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 the workplace, Tactics and strategies.	08
4	**Human Resource Planning**	08

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	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.	
5	**Labor Laws and Industrial Relations:** Evolution of IR, IR issues in organizations, Overview of Labor Laws in India; Industrial Disputes Act, Trade Unions Act, Shops and Establishments Act. **Emerging Trends in HR** 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 differences among employees motivation.	**08**
	Total	**42**

Books Recommended:

Reference Books:

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

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Corporate Finance Management (DJS22ILO8025)		

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

Objectives:

1. Overview of the 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, and dividend policy.

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

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

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

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05	**Capital Structure:** Factors Affecting an Entity's Capital Structure; Overview of Capital Structure Theories and Approaches Net Income Approach, Net Operating Income Approach; Traditional Approach, and Modigliani-Miller Approach. Relation between Capital Structure and Corporate Value; Concept of Optimal Capital Structure Dividend Policy: Meaning and Importance of Dividend Policy; Factors Affecting an Entity's Dividend Decision; Overview of Dividend Policy Theories and Approaches- Gordon's Approach, Walter's Approach, and Modigliani-Miller Approach	09
	Total	**42**

Books Recommended:

Reference Books:

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

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Logistic and Supply Chain Management (DJS22ILO8026)		

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, the 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. Understand various sustainability aspects of a supply chain.

Logistic and Supply Chain Management (DJS22ILO8026)		
Unit	**Description**	**Duration**
01	**Understanding the Supply Chain:** Objective, Importance, Decision Phases, Process Views. **Achieving Strategic Fit and Scope:** Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope, Challenges to Achieving and Maintaining Strategic Fit. **Supply Chain Drivers and Metrics:** Financial Measures of Performance, Drivers of Supply Chain Performance, Framework for Structuring Drivers, Facilities, Inventory, Transportation, Information, Sourcing, Pricing. **Creating the Responsive Supply Chain:** Product push versus demand pull, The Japanese philosophy, The foundations of agility, A route-map to responsiveness.	8
02	**Designing the Supply Chain and Transportation Networks** **Designing Distribution Networks:** The Role of Distribution in the Supply Chain, Factors Influencing Distribution Network Design, Design Options for a Distribution Network. **Network Design in the Supply Chain:** The Role of Network Design in the Supply Chain, Factors Influencing Network Design Decisions, Framework for Network Design Decisions, Models for Facility Location and Capacity Allocation. **Designing Global Supply Chain Networks:** The Impact of Globalization on Supply Chain Networks, The Offshoring Decision: Total Cost, Risk Management in Global Supply Chains, Discounted Cash Flows, Evaluating Network Design Decisions Using Decision Trees. **Transportation in a Supply Chain:** The Role of Transportation in a Supply Chain, Modes of Transportation and their Performance Characteristics, Design Options for a Transportation Network, Trade-Offs in Transportation Design, Tailored Transportation.	10
03	**Coordination in a Supply Chain:** Lack of Supply Chain Coordination and the Bullwhip Effect, The Effect on	8

	Performance of Lack of Coordination, Obstacles to Coordination in a Supply Chain, Managerial Levers to Achieve Coordination, Continuous Replenishment and Vendor-Managed Inventories, Collaborative Planning, Forecasting, and Replenishment. **Sourcing Decisions in a Supply Chain:** The Role of Sourcing in a Supply Chain, In-House or Outsource, Third- and Fourth-Party Logistics Providers, Using Total Cost to Score and Assess Suppliers, Supplier Selection-Auctions and Negotiations, Contracts, Risk Sharing and Supply Chain Performance, Design Collaboration, The Procurement Process.	
04	**Pricing and Revenue Management in a Supply Chain:** The Role of Pricing and Revenue Management in a Supply Chain, Pricing and Revenue Management for Multiple Customer Segments, Pricing and Revenue Management for Perishable Assets, Pricing and Revenue Management for Seasonal Demand, Pricing and Revenue Management for Bulk and Spot Contracts. **Information Technology in a Supply Chain:** The Role of IT in a Supply Chain, The 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.	**8**
05	**Creating a Sustainable Supply Chain:** The Role of Triple Bottom Line, Key Metrics for Sustainability, Greenhouse gases and the supply chain, Reducing the transport-intensity of supply chains, Beyond the carbon footprint, Reduce, reuse, recycle, Sustainability and Supply Chain Drivers. **Introduction to the Supply Chain of the Future:** Emerging Megatrends.	**8**
	Total	**42**

Books Recommended:

Reference Books:

- Logistics & Supply Chain Management, Martin Christopher, Pearson Education Limited, 2016.
- Supply Chain Management Strategy, Planning, and Operation, Sunil Chopra and Peter Meindl, Pearson, 2016.
- Essentials of Supply Chain Management, Michael H. Hugos, Wiley, 2018.
- Supply Chain Management For Dummies, Daniel Stanton, Wiley, 2020.
- 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.
- Supply Chain Management, Sinha, McGraw-Hill Education (India) Pvt Limited, 2012.

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: IPR and Patenting (DJS22ILO8027)		

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.

Outcomes: On completion of the course, the 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.

IPR and Patenting (DJS22ILO8027)		
Unit	**Description**	**Duration**
1	**Concept of Intellectual Property Law** Idea/Expression dichotomy, Introduction, and the need for intellectual property rights (IPR), Intellectual Property laws, IPR in India: Genesis and development, IPR abroad, Major International Instruments concerning Intellectual Property Rights: Paris Convention, the Berne Convention, the Universal Copyright Convention, the WIPO Convention, the Patent Cooperation Treaty, the TRIPS Agreement, incentive theory, types of IPR, India's New National IP Policy, 2016, Govt. Schemes in IPR IP	8
2	**Patents and Trademarks** Elements of Patentability: Novelty, Non-Obviousness, Industrial Application, Non Patentable Subject Matter, Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties, Patent Office and Appellate Board, Case study of existing patents related to software, healthcare, and devices Concept of Trademarks, Different kinds of marks (brand names, logos, signatures, symbols, well-known marks, certification marks, and service marks), Non Registrable Trademarks, Registration of Trademarks, Rights of holder and assignment and licensing of marks, Infringement, Remedies & Penalties, Trademarks registry and appellate board	10
3	**Copyrights and Designs** 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 & Penalties, Related Rights, distinction between related rights and copyrights Design: meaning and concept of novel and original, procedure for registration, effect of registration and term of protection.	8
4	**GI, PVP, and LDP** Geographical indication: meaning, difference between GI and trademarks, procedure for registration, effect of registration, and term of protection. Plant variety protection: meaning, benefit sharing, farmers' rights, procedure for registration, effect of registration, and term of protection. Layout Design protection: meaning, procedure for registration, effect of registration, term of protection	8
5	**Beyond IP** Introduction to Competition Law: concept of competition, relationship and Interaction	8

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	between IPR and competition law, IP and competition issues, Technology transfer agreements. EU experience with IP and Competition Law, the Indian Competition Act, and IPR protection, IPR issues in mergers and acquisitions, harmonization of IP protection, and competition Law in India.	
	Total	**42**

Books Recommended:

Reference Books:

- Feroz Ali, The Law of Patents, LexisNexis
- Ronald D. Slusky, Invention Analysis and Claiming - A Patent Lawyer's Guide, Second Edition, American Bar Association, 2012.
- Feroz Ali, The Touchstone Effect: The Impact of Pre-grant Opposition on Patents, LexisNexis, 2009.
- Innovation and entrepreneurship by Drucker. F. Peter, Harper's Business, (2006).
- Intellectual Property Rights, Deborah. E. Bouchoux, Cengage Learing.
- Intellectual Property Rights-Unleash The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,
- The Design of Business- by Martin Roger, Harvard Business Publishing (2009)

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Digital Marketing Management (DJS22ILO8028)		

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
8. (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 a digital marketing strategy roadmap.
3. Explain the terminology and concepts for developing web-specific media plans.
4. Understand concepts related to digital campaign management and revenue generation models.
5. Get a perspective on global digital marketing technology/tools and future trends.

Digital Marketing Management (DJS22ILO8028)		
Unit	**Description**	**Duration**
1	**Introduction to Digital Marketing** Emergence of Digital Marketing as a tool, media consumption drivers for a 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, and critical success factors for digital marketing. **Digital Marketing Models Creation:** Factors impacting the digital marketplace, value chain digitization, and business models. **The Consumer for Digital Marketing:** Consumer behavior on the internet, evolution of consumer behavior models, managing consumer demand, integrated marketing communications (IMC), and impact of digital channels on IMC.	8
2	**Digital Marketing Strategy Development** Elements of the assessment phase, macro-micro environmental analysis, and marketing situation analysis. **Digital Marketing Internal Assessment and Objectives Planning:** Analyzing the present offerings mix, marketing mix, core competencies analysis, and internal resource mapping. Digital presence analysis, digital marketing objectives development, and review. **Digital Marketing Strategy Definition** Understanding digital business strategy and structures, consumer development	10

	strategy, offering mix for Digital, digital pricing models, managing promotional channels, and developing the extended Ps- People, process, programs, and performance. **Digital Marketing Strategy Roadmap:** Developing a digital marketing strategy roadmap, the 6s digital marketing implementation strategy, and marketing across the product life cycle.	
3	**Digital Marketing Planning and Setup** Understanding digital media planning terminology and stages, steps to creating a marketing communications strategy, introduction to search marketing, display marketing, and social media marketing. **Digital Marketing Operations Setup:** Basics of lead generation and conversion marketing, website content development and management, elements of user experience, web usability, and evaluation.	8
4	**Digital Marketing Execution** Basic elements of digital campaign management, search execution, display execution, social media execution, and content marketing. Digital Marketing Execution Elements Digital revenue generation models, managing service delivery and payments, managing digital implementation challenges like e-commerce, internal & external, and consumer-specific challenges.	8
5	**Digital Business - Present and Future** 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.	8
	Total	42

Books Recommended:

Reference Books:

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

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Environmental Management (DJS22ILO8029)		

Pre-requisites: Basic Knowledge of Probability and Statistics.

Objectives:

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

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

1. Identify Environmental issues and get familiarized with the concept of the Ecosystem and environmental management.
2. Know policies and legal aspects and understand EM system standards.
3. Understand the Environmental Impact Assessment.
4. Understand Environment Auditing procedures.
5. Describe Environmental Management Techniques

Environmental Management (DJS22ILO8029)		
Unit	**Description**	**Duration**
1	**Principles of Environmental Management (EM):** Introduction of EM, Definition, Ecosystem concept, Participants in EM, Ethics and the environment, International Environmental Movement, Environmental issues relevant to India.	**8**
2	**Policy and Legal Aspects of EM:** - 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.	**9**
3	**Environmental Impact Assessment (EIA):** Purpose, steps, hierarchy of EIA, Environmental Impact Statement and Impact Indicators, Evolution of IA in India and worldwide. Preliminary stages of EIA, Impact, Prediction, Evaluation and Mitigation.	**9**
4	**Environmental Auditing (EA):-** Objectives, Scope and Types of EA, Audit Methodology, Elements of Audit Process, Auditing of EMS.	**8**
5	**Environmental Management Techniques:** - Environmental Monitoring and Modelling, Environmental technology Assessment and Environmental Risk Assessment, Eco-mapping.	**8**
	Total	**42**

Books Recommended:

Text Books:

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

Reference Books:

- A Handbook of Environmental Management, Edited by Jon C. Lovett and David G. Ockwell, Edward Elgar Publishing.

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- Indian Standard Environmental Management Systems - Requirements with Guidance for Use, Bureau Of Indian Standards, February 2005.
- Environmental Management: An Indian Perspective, S N Chary and Vinod Vyasulu, Macmillan India, 2000.
- Introduction to Environmental Management, Mary K Theodore and Louise Theodore, CRC Press.
- Environment and Ecology, Majid Hussain, 3rd Ed. Access Publishing, 2015.

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Program: Common for All Programs	Final Year B.Tech	Semester: VIII
Course: Labour and Corporate Law (DJS22ILO8030)		

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 the free enterprise system and the legal safeguards of the same.

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

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

Labour and Corporate Law (DJS22ILO8030)		
Unit	**Description**	**Duration**
1	**Trade Unions and Collective Bargaining:** Trade Unionism in India, Definition of Trade Union and Trade Dispute, General and Political Funds of Trade Union, Civil and Criminal Immunities of Registered Trade Unions, Recognition of Trade Union, Collective Bargaining	8
2	**Industrial Dispute and Instruments of Economic Coercion:** Industrial Dispute and Individual Dispute, Settlement of Industrial Dispute. Concept of strike, Gherao, Bandh, and Lock-out, Types of Strike, Rights to Strike and Lock-out	9
3	**Formation of a Company and Corporate Governance:** Company and Other Forms of Business Organizations, Different Kinds of Companies: One Person Company, Foreign Company. Kinds of Company Meetings and Procedure Powers, Duties, and Kinds of Directors: Independent Director, Women Director. Different Prevention of Oppression and Mismanagement, Investor Protection, Insider Trading, Corporate Fraud.	9
4	**Corporate Social Responsibility and Corporate Liquidation:** Evolution of Corporate Social Responsibility, Corporate Criminal Liability, Corporate Environmental Liability, Different Types of Winding up of Company, Role of Courts in Winding up of Company, Merger and Acquisition of Company, Cross-Border Merger, Takeover Code: Role of SEBI	8
5	Case Studies on A) Labour law B) Labour relations C) Corporate laws D) Securities laws	8
	Total	**42**

Books Recommended:

Reference Books:

- Surya Narayan Misra, An Introduction to Labour and Industrial Law, Allahabad Law Agency, 1978.

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- Indian Law Institute, Cases and Materials on Labour Law and Labour Relations, P.L. Malik, Industrial Law, Eastern Book Company, 2013.
- S.C. Srivastava, Industrial Relations and Labour Law, Vikas Publishing House, New Delhi.
- C.A. Kamal Garg, Bharat's Corporate and Allied Laws, 2013.
- Institute of Company Secretaries of India, Companies Act 2013, CCH Wolter Kluver Business, 2013.
- Saleem Sheikh & William Rees, Corporate Governance & Corporate Control, Cavendish Publishing Ltd., 1995
- Taxmann, A Comparative Study of Companies Act 2013 and Companies Act 1956.

Ranjit

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Program: Artificial Intelligence & Machine Learning	B. Tech	Semester: VIII
Course: Project Stage II (DJS22AMP803)		

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.

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Program: Artificial Intelligence & Machine Learning	B. Tech	Semester: VIII
Course: Disaster Management and Preparedness (DJS22A4)		

Objectives:

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

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

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

Disaster Management and Preparedness (DJS22A4)		
Unit	**Description**	**Duration**
1	**Understanding Disasters & Hazards:** • **Definition and types of disasters**: Natural, Man-made and hybrid disasters, **Study of Natural disasters**: Flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion etc. **Study of Human/Technology Induced Disasters**: Chemical, Industrial and Nuclear disasters, internally displaced persons, road and train accidents Fire Hazards, terrorism, militancy, • Hazard & Vulnerability profiles of India (seismic zones, flood-prone areas). • India's vulnerability to disasters, and the impact of disasters on National development.	06
2	**Disaster Risk Reduction (DRR) & Mitigation:** • **Disaster Management Cycle**: Prevention, Mitigation, Preparedness, Response, Recovery. Need for disaster prevention and mitigation, mitigation guiding principles, challenging areas, structural and non-structural measures for disaster risk reduction. • Risk Assessment & Vulnerability Analysis. • **Science & Technology**: Use of information management, Geo informatics like RS, GIS, GPS and remote sensing mitigation measure.	06

3	**Disaster Preparedness & Response:** • Preparedness Planning, Early Warning Systems (EWS), & Communication. • Emergency Response: Search & Rescue, Logistics, Medical Aid. • Psychological Response & Management (Trauma, Stress). • Role of IT, Media, Govt., NGOs, & Community.	04
4	**Recovery, Rehabilitation & Reconstruction:** • Post-disaster damage assessment. • Rehabilitation, Reconstruction, & Livelihood Restoration. • Sanitation, Hygiene, & Waste Management.	04
5	**Policy, Governance & Capacity Building:** • National Disaster Management Authority (NDMA) & Legislation. • Institutional Mechanisms & Community Mobilization. Non-Structural Mitigation: Community based disaster preparedness, capacity development and training, awareness and education, contingency plans.	04
6	**Case studies on disaster (National /International):** • Case study discussion of National Disasters: Tsunami (2004), Bhopal gas tragedy, Kerala and Uttarakhand flood disaster, 26th July 2005 Mumbai flood • Case study discussion of International Disasters: Hiroshima – Nagasaki (Japan), Cyclone Phailin (2013), Fukushima, Daiichi nuclear disaster (2011), Chernobyl meltdown	04
	Total	28

Books Recommended:

Reference Books and Reports:

1. Disaster Management, by Harsh K. Gupta, Universities Press Publications (2003).
2. Disaster Management: An Appraisal of Institutional Mechanisms in India, by O. S. Dagur, published by Centre for land warfare studies, New Delhi, 2011.
3. Introduction to International Disaster Management, by Damon Copolla, Butterworth Heinemann Elsevier Publications (2015).
4. Disaster Management Handbook, by Jack Pinkowski, CRC Press, Taylor and Francis group (2008).
5. Disaster management & rehabilitation, by Rajdeep Dasgupta, Mittal Publications, New Delhi (2007).
6. Natural Hazards and Disaster Management, Vulnerability and Mitigation, by R B Singh, Rawat Publications (2006).
7. Concepts and Techniques of GIS, by C. P. Lo Albert, K.W. Yonng, Prentice Hall (India) Publications (2006).
8. Risk management of natural disasters, by Claudia G. Flores Gonzales, KIT Scientific Publishing (2010).
9. Disaster Management – a disaster manger's handbook, by W. Nick Carter, Asian Development Bank (2008).

10. Disaster Management in India, by R. K. Srivastava, Ministry of Home Affairs, GoI, New Delhi (2011)
11. The Chernobyl Disaster: Legacy and Impact on the Future of Nuclear Energy, by Wil Mara, Marshall Cavendish Corporation, New York, 2011.
12. The Fukushima 2011 Disaster, by Ronald Eisler, Taylor & Francis, Florida, 2013.

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

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