




Here's the **combined syllabus** for **Artificial Intelligence (AI), Machine Learning (ML), and Neural Networks**, integrating both:

-  **NEC (Engineering Registration)**
-  **NRB (Assistant Director – IT Officer)**









Each topic is marked accordingly, and overlapping areas are unified while maintaining full content integrity.

Combined Syllabus: Artificial Intelligence, Machine Learning & Neural Networks










Legend:

-  NEC
-  NRB
-  Covered in Both





1. Introduction to AI and Intelligent Agents





-  Concept of Artificial Intelligence
-  AI Perspectives and History
-  Applications of AI
-  Foundations of AI
-  Intelligent Agents:
 - Structure
 - Properties
 - PEAS (Performance measure, Environment, Actuators, Sensors)
 - Types: Simple Reflex, Model-Based, Goal-Based, Utility-Based
-  Environment Types: Deterministic, Stochastic, Static, Dynamic, Observable, Semi-observable, Single-Agent, Multi-Agent
-  Introduction to AI
-  Shared AI fundamentals

2. Problem Solving and Search Techniques







-  Problem as State Space Search
 -  Problem Formulation
 -  Well-defined Problems
 -  Constraint Satisfaction Problems
 -  **Uninformed Search:**
 - Depth First Search
 - Breadth First Search
 - Depth Limited Search
 - Iterative Deepening Search
 - Bidirectional Search
 -  **Informed Search:**
 - Greedy Best-First Search
 - A* Search
 - Hill Climbing
 - Simulated Annealing
 -  Game Playing and Adversarial Search:
 - Mini-max
 - Alpha-Beta Pruning
 -  Problem Decomposition and Planning
 -  Shared problem-solving concepts
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3. Logic, Reasoning, and Knowledge Representation







-  Approaches and Issues in Knowledge Representation
-  Knowledge Mapping
-  Semantic Nets, Frames
-  **Propositional Logic (PL):**
 - Syntax, Semantics, Connectives
 - Tautology, Validity
 - Well-formed Formula (WFF), Resolution

-  **Predicate Logic (FOPL):**
 - Syntax, Semantics
 - Quantifiers
 - Inference, Unification
 - Resolution Refutation
 -  Bayesian Reasoning:
 - Bayes' Rule
 - Bayesian Networks
 - Reasoning in Belief Networks
 -  Logic and Reasoning
 -  Logic-based AI
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4. Natural Language Processing (NLP) and Expert Systems






-  Expert Systems:
 - Architecture
 - Knowledge Acquisition
 - Declarative vs Procedural Knowledge
 - Expert System Development
 -  Natural Language Processing:
 - NLP Terminology
 - NLP Understanding and Generation
 - NLP Steps
 - NLP Challenges and Applications
 -  Machine Vision:
 - Concepts and Stages
 -  Robotics (brief intro)
 -  Natural Language Processing
 -  NLP core concepts
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5. Machine Learning and Pattern Recognition




-  ML Introduction & Concepts of Learning
 -  Types of Learning:
 - Supervised
 - Unsupervised
 - Reinforcement
 -  **Learning Approaches:**
 - Inductive (Decision Trees)
 - Statistical (Naive Bayes)
 - Fuzzy Learning
 - Fuzzy Inference System & Methods
 - Genetic Algorithm (Operators, Encoding, Selection, Fitness, Parameters)
 -  Machine Learning
 -  Pattern Recognition
 -  ML fundamentals
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6. Artificial Neural Networks (ANN)

-  Biological Neural Networks vs Artificial Neural Networks
-  McCulloch–Pitts Neuron Model
-  ANN Mathematical Model
-  Activation Functions
-  ANN Architectures
-  The Perceptron
-  Learning Concepts:
 - Learning Rate
 - Gradient Descent
 - Delta Rule
 - Hebbian Learning

- Adaline
-  Multilayer Perceptron (MLP)
-  Backpropagation Algorithm
-  Hopfield Neural Network
-  ANN (covered jointly with NLP)
-  Artificial Neural Network fundamentals

Summary Table: Topic Coverage by Source

Topic Area	 NEC	 NRB	 Both
Introduction to AI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Intelligent Agents	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Problem Solving & Search Techniques	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Planning and Decomposition	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Logic & Reasoning	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Knowledge Representation (Advanced)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NLP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Expert Systems	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Machine Learning	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pattern Recognition	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Fuzzy Logic & Genetic Algorithms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Neural Networks (ANN)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Robotics & Machine Vision	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Would you like this prepared as a **PDF syllabus sheet, study-friendly table**, or **PowerPoint slides** for revision or teaching purposes?