AKTU B.E./B.Tech MECH Sem 8 syllabus

Machine Learning

Machine Learning

UNIT-I

INTRODUCTION – Well defined learning problems, Designing a Learning
System, Issues in Machine Learning; THE CONCEPT LEARNING TASK -
General-to-specific ordering of hypotheses, Find-S, List then eliminate algorithm, Candidate elimination algorithm, Inductive bias

UNIT-II

DECISION TREE LEARNING - Decision tree learning algorithm- Inductive
bias- Issues in Decision tree learning; ARTIFICIAL NEURAL NETWORKS –
Perceptrons, Gradient descent and the Delta rule, Adaline, Multilayer networks,
Derivation of backpropagation rule Backpropagation AlgorithmConvergence,
Generalization;

UNIT-III

Evaluating Hypotheses: Estimating Hypotheses Accuracy, Basics of sampling
Theory, Comparing Learning Algorithms; Bayesian Learning: Bayes theorem,
Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian
belief networks, EM algorithm;

UNIT-IV

Computational Learning Theory: Sample Complexity for Finite Hypothesis
spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound
Model of Learning; INSTANCE-BASED LEARNING – k-Nearest Neighbour

Learning, Locally Weighted Regression, Radial basis function networks, Case-
based learning

UNIT-V

Genetic Algorithms: an illustrative example, Hypothesis space search, Genetic

Programming, Models of Evolution and Learning; Learning first order rules-
sequential covering algorithms-General to specific beam search-FOIL;

REINFORCEMENT LEARNING - The Learning Task, Q Learning.

Non-Destructive Testing

Non-Destructive Testing

Unit-I:
Introduction:
Scope and advantages of NDT, Comparison of NDT with Destructive Testing, some commonNDT
methods used since ages, Terminology, Flaws and Defects, Visual inspection, Equipmentused for visual
inspection. Ringing test, chalk test (oil whitening test). Uses of visual inspectiontests in detecting
surface defects and their interpretation, advantages & limitations of visualinspection.
Unit-II:
Tests:
Die penetrate test (liquid penetrate inspection), Principle, scope. Equipment & techniques, Testsstations,
Advantages, types of penetrants and developers, Zyglo test, Illustrative examples andinterpretation of

defects.
Magnetic particle Inspection – scope and working principle, Ferro Magnetic and
Nonferromagneticmaterials, equipment & testing. Advantages, limitations Interpretation of results,DC
& AC magnetization, Skin Effect, use of dye & wet powders for magna glow testing,different methods
to generate magnetic fields, Applications.

Unit-III:

Radiographic methods:

Introduction to electromagnetic waves and radioactivity, various decays, Attenuation ofelectromagnetic
radiations, Photo electric effect, Rayleigh's scattering (coherent scattering),Compton's scattering
(Incoherent scattering), Pair production, Beam geometry and Scatteringfactor.
X-ray radiography: principle, equipment & methodology, applications, types of radiations
andlimitations. γ-ray radiography – principle, equipment., source of radioactive materials &technique,
advantages of γ-ray radiography over X-ray radiography Precautions against radiationhazards. Case
Study - casting and forging.

Unit-IV:

Ultrasonic testing methods:

Introduction, Principle of operation, Piezoelectricity. Ultrasonic probes, CRO techniques,advantages,
Limitation & typical applications. Applications in inspection of castings, forgings,Extruded steel parts,
bars, pipes, rails and dimensions measurements. Case Study – Ultrasonography of human body.

Unit-V:

Special NDT Techniques:

Eddy Current Inspection:
Principle, Methods, Equipment for ECT, Techniques, Sensitivity,advanced ECT methods. Application,
scope and limitations, types of Probes and Case Studies.Introduction to Holography, Thermography and
Acoustic emission Testing.

Theory of Elasticity

Theory of Elasticity

UNIT I:

Basic Equations of Elasticity:

Definition of Stress and Strain: Stress – Strain Relationships – Equations of Equilibrium,
Compatibility Equations, Boundary Conditions, Saint Venant'sprinciple – Principal Stresses, Stress Ellipsoid – Stress Invariants.

UNIT II:

Plane Stress and Plane Strain Problems:

Airy's Stress Function, Bi-Harmonic Equations, Polynomial Solutions, Simple Two-Dimensional
Problems in Cartesian Coordinates Like Bending of Cantilever and Simply Supported Beams.

UNIT III:

Polar Coordinates:

Equations of Equilibrium, Strain – Displacement Relations, Stress – Strain Relations, Airy's
Stress Function, Axis – Symmetric Problems, Introduction toDunder's Table, Curved Beam Analysis,
Lame's, Kirsch, Michell's And Boussinesque Problems – Rotating Discs.

UNIT IV:

Torsion:

Navier's Theory, St. Venant's Theory, Prandtl's Theory on Torsion, Semi- Inverse Method and
Applications to Shafts of Circular, Elliptical, Equilateral Triangular and Rectangular Sections.
Membrane Analogy.

UNIT V:

Introduction to Theory of Plates and Shells:

Classical Plate Theory – Assumptions – Governing Equations – Boundary conditions – Navier's Method
of Solution for Simply Supported Rectangular Plates Levy's Method of Solution forRectangular Plates
Under Different Boundary Conditions.