



**Program : Mechatronics Engineering**

**Second Year : Semester - III**

**Course Code: MTC301**

**Course Name: Engineering Mathematics-III**

MTC301.1	Apply the concept of Laplace transform to solve the real integrals in engineering problems.
MTC301.2	Apply the concept of inverse Laplace transform of various functions in engineering problems.
MTC301.3	Expand the periodic function by using Fourier series for real life problems and complex engineering problems.
MTC301.4	Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory.
MTC301.5	Apply Matrix algebra to solve the engineering problems.
MTC301.6	Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations.

**Course Code: MTC302**

**Course Name: Data Structures and Algorithms**

MTC302.1	Implement various operations using linear data structures.
MTC302.2	Apply concepts of Trees and Graphs to a given problem.
MTC302.3	Analyse time and space complexity of an algorithm.
MTC302.4	Apply divide and conquer strategy to solve problems.
MTC302.5	Apply the concept of Greedy and Dynamic Programming approach to solve problems.
MTC302.6	Apply the concept of backtracking, branch and bound strategy to solve problems.

**Course Code: MTC303**

**Course Name: Engineering Materials and Metallurgy**

MTC303.1	Distinguish different types of materials and composites used in manufacturing.
MTC303.2	Select a material for specific applications.
MTC303.3	Read and interpret Iron-Iron Carbide phase diagram, TTT diagram and CCT diagram.
MTC303.4	Demonstrate a deeper understanding of materials in engineering applications.
MTC303.5	Distinguish different types of materials and composites used in manufacturing.
MTC303.6	Select a material for specific applications.



**Program : Mechatronics Engineering**

**Second Year : Semester - III**

**Course Code: MTC304**

**Course Name: Basic Electronics and Digital Circuit Design**

MTC304.1	Illustrate working of Transistors & its applications.
MTC304.2	Describe several JFET applications including switch & amplifiers.
MTC304.3	Describe the number system and operations of logical gates.
MTC304.4	Design combinational digital logic circuits.
MTC304.5	Design Sequential digital logic circuits.
MTC304.6	Describe the testing technologies in digital electronics.

**Course Code: MTC305**

**Course Name: Electrical Circuits and Machines**

MTC305.1	Analyse and Synthesis of network theorems for DC and AC circuits.
MTC305.2	Find two port circuits parameters.
MTC305.3	Analyse and Synthesis R-L-C circuits in time and Frequency domain.
MTC305.4	Illustrate working and performance characteristics of DC Motors.
MTC305.5	Illustrate working and performance characteristics of three phase Induction Motor.
MTC305.6	Implement systems using low power motors specially designed motors.

**Course Code: MTL301**

**Course Name: Data Structures and Algorithms Lab**

MTL301.1	Implement various operations using linear data structures.
MTL301.2	Apply concepts of Trees and Graphs to a given problem.
MTL301.3	Analyze time and space complexity of an algorithm.
MTL301.4	Apply divide and conquer strategy to solve problems.
MTL301.5	Apply the concept of Greedy and Dynamic Programming approach to solve problems.
MTL301.6	Apply the concept of backtracking, branch and bound strategy to solve problems.



**Program : Mechatronics Engineering**

**Second Year : Semester - III**

**Course Code: MTL302**

**Course Name: Applied Electronics Laboratory-I**

MTL302.1	Implement switching circuits using BJT, MOSFET, JFET.
MTL302.2	Implement different LOGIC circuits.
MTL302.3	Analyse operational characteristics of different Electrical Machines.
MTL302.4	Simulation of Electrical Networks.

**Course Code: MTL303**

**Course Name: Electrical and Electronics Workshop**

MTL303.1	Understand working of different lab equipment.
MTL303.2	Demonstrate skills in handling electrical components.
MTL303.3	Repair and do maintenance of households appliances.
MTL303.4	Demonstrate PCB design and soldering skills.
MTL303.5	Understand working of different parts of Computer.
MTL303.6	Simulate Electrical networks using software techniques.

**Course Code: MTL304**

**Course Name: CAD – Modeling**

MTL304.1	Illustrate basic understanding of types of CAD model creation.
MTL304.2	Visualize and prepare 2D modeling of a given object using modeling software.
MTL304.3	Build solid model of a given object using 3D modeling software.
MTL304.4	Visualize and develop the surface model of a given object using modeling software.
MTL304.5	Generate assembly models of given objects using assembly tools of a modeling software
MTL304.6	Perform product data exchange among CAD systems.



**Program : Mechatronics Engineering**

**Second Year : Semester - III**

**Course Code: MTPBL301**

**Course Name: Mini Project - 1A**

MTPBL301.1	Identify problems based on societal /research needs.
MTPBL301.2	Apply Knowledge and skill to solve societal problems in a group.
MTPBL301.3	Develop interpersonal skills to work as a member of a group or leader.
MTPBL301.4	Draw the proper inferences from available results through theoretical/ experimental/simulations.
MTPBL301.5	Analyze the impact of solutions in societal and environmental context for sustainable development.
MTPBL301.6	Use standard norms of engineering practices.
MTPBL301.7	Excel in written and oral communication.
MTPBL301.8	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
MTPBL301.9	Demonstrate project management principles during project work.



**Program : Mechatronics Engineering**

**Second Year : Semester - IV**

**Course Code: MTC401**

**Course Name: Engineering Mathematics-IV**

MTC401.1	Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem, Stoke's theorem & Gauss Divergence theorem.
MTC401.2	Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals.
MTC401.3	Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science.
MTC401.4	Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.
MTC401.5	Apply the concept of probability distribution to engineering problems & testing hypothesis of small samples using sampling theory.
MTC401.6	Apply the concepts of parametric and nonparametric tests for analyzing practical problems.

**Course Code: MTC402**

**Course Name: Kinematics of Machinery**

MTC402.1	Identify various components of mechanisms.
MTC402.2	Conduct displacement, velocity and acceleration analysis of various mechanisms.
MTC402.3	Synthesize mechanisms to provide specific motion.
MTC402.4	Select appropriate power transmission mechanism.
MTC402.5	Choose a cam profile for the specific follower motion.

**Course Code: MTC403**

**Course Name Thermal and Fluid Engineering**

MTC403.1	Demonstrate understanding of basic concepts of thermodynamics.
MTC403.2	Illustrate the physical properties and characteristic behavior of fluids.
MTC403.3	Illustrate dimensional analysis for model and similitudes.
MTC403.4	Identify & explain the three modes of heat transfer (conduction, convection and radiation) with mathematical model.
MTC403.5	Design and analyze different heat exchangers.
MTC403.6	Demonstrate basic understanding of turbines and IC engine.



**Program : Mechatronics Engineering**

**Second Year : Semester - IV**

**Course Code: MTC404**

**Course Name: Strength of Materials**

MTC404.1	Demonstrate fundamental knowledge about various types of loading and stresses induced.
MTC404.2	Draw the SFD and BMD for different types of loads and support conditions.
MTC404.3	Analyse the bending and shear stresses induced in beam.
MTC404.4	Analyse the deflection in beams and stresses in shaft.
MTC404.5	Analyse the stresses and deflection in beams and Estimate the strain energy in mechanical elements.
MTC404.6	Analyse buckling phenomenon in columns.

**Course Code: MTC405**

**Course Name: Application of Integrated Circuits**

MTC405.1	Demonstrate an understanding of fundamentals of integrated circuits.
MTC405.2	Analyse the various applications and circuits based on particular linear integrated circuit.
MTC405.3	Select and use an appropriate integrated circuit to build a given application.
MTC405.4	Design an application with the use of integrated circuit.

**Course Code: MTL401**

**Course Name: Applied Electronics Laboratory-II**

MTL401.1	Characterize op-amp
MTL401.2	Design and test of various op amp circuits.
MTL401.3	Do time domain characterization of system.

**Course Code: MTL402**

**Course Name: Material Testing Laboratory**

MTL402.1	Understand the procedure used to prepare metallic samples for studying its microstructure.
MTL402.2	Identify effects of heat treatment on microstructure of medium carbon steel and hardenability of steel using Jominy end Quench test.
MTL402.3	Perform Fatigue Test and draw S-N curve.
MTL402.4	Perform Tension test to analyse the stress - strain behaviour of materials.
MTL402.5	Measure torsional strength, hardness and impact resistance of the material.
MTL402.6	Perform flexural test with central and three-point loading conditions.



<b>Program : Mechatronics Engineering</b>	
<b>Second Year : Semester - IV</b>	
<b>Course Code: MEL403</b> <b>Course Name: Thermal and Fluid Engineering Lab</b>	
MTL403.1	Verify the Bernoulli's principle and calibration venturimeter / orificemeter.
MTL403.2	Calculate friction factor & different losses in the pipe flow.
MTL403.3	Estimate thermal conductivity of metals/non-metals.
MTL403.4	Compute heat transfer coefficient in natural as well forced convection.
<b>Course Code: MTL404</b> <b>Course Name: Technical Computing Laboratory</b>	
MTL404.1	Import, manipulate and graphically represent data.
MTL404.2	Perform basic engineering calculations using automated tools.
MTL404.3	Apply programming for modeling engineering systems.
MTL404.4	Manipulate and visualize complex data.
<b>Course Code: MTL405</b> <b>Course Name: Machine Shop Practice</b>	
MTL405.1	Know the specifications, controls and safety measures related to machines and machining operations.
MTL405.2	Use the machines for making various engineering jobs.
MTL405.3	Perform various machining operations.
MTL405.4	Perform Tool Grinding.
MTL405.5	Perform welding operations.



<b>Program : Mechatronics Engineering</b>	
<b>Second Year : Semester - IV</b>	
<b>Course Code: MTPBL401</b>	<b>Course Name: Mini Project - 1B</b>
MTPBL401.1	Identify problems based on societal /research needs.
MTPBL401.2	Apply Knowledge and skill to solve societal problems in a group.
MTPBL401.3	Develop interpersonal skills to work as member of a group or leader.
MTPBL401.4	Draw the proper inferences from available results through theoretical/ experimental/ simulations.
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