COURSE CONTENT

COMPUTATIONAL TECHNIQUES LABORATORY								
I Semester: CAD / CAM								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BCCD12	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	4	2	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		

I. COURSE OVERVIEW:

This course is designed to give an overview of Computational Techniques of interest to engineers. Focus will be on numerical methods, their properties and analysis.

II. COURSE OBJECTIVES:

The students will try to learn

I. The MAT LAB programs for simple and complex engineering problems.
II. The output graphical plots of SF, BM for the given loads and thermal stress analysis of piston using MATLAB programs.
III. The MATLAB programs for graphic functions, multi body dynamics and solutions of difference equation using Euler method.
IV. The real time applications such as vibration and acceleration implemented using MATLAB programs.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1 Develop program and plot the Shear force, bending moment and geometric functions of single and double variables for complex engineering problems.
CO 2 Analysis of piston through MATLAB for thermal stresses.
CO 3 Develop formulation of ideal gas equation using MATLAB for thermodynamic relations.
CO 4 Develop Euler equation of motion using MATLAB programs to find path movement.
CO 5 Apply Simulation for multi body dynamic analysis software for balancing vibration.
CO 6 Determination of polynomial equation using method of Least Square Curve Fitting.

IV. LIST OF EXPERIMENTS:

Week-1: Introduction to MAT Lab Program
Applications to MATLAB in Mechanical Engineering.

Week-2: MAT Lab Program to Plot the Internal Forces, and Bending Moment
The radius of the semicircular member is 25 mm and supported with roller and hinged supports.
The load 300N acting vertically downward at the center and 200 N acting horizontally at the roller support toward left direction.
Write a MATLAB program to plot the internal forces, namely, the axial forces, shearing force and bending moment as functions of α for $0 < \alpha < 90^{o}$.

Week-3: Thermal Stress Analysis of Piston Using MAT Lab Program
Temperature distribution around the given piston dimensions.

Week-4: Formulation of Ideal and Real Gas Equations
Gas phase thermodynamic equations of state relate the three state variables of temperature, pressure, and

volume for a gas. One of the three state variables can be calculated through the equation of state if values for the other two variables are known. For example, the ideal gas law states PV = RT ~ where P: pressure, Pa: V: specific or molar gas volume, m^3 mol R: ideal gas constant, (= 8.314 J/(mol K)) T : absolute temperature, K.

Week-5: Using MAT Lab Program Plot the Function of One Variable and Two Variable
Graphing-functions of one variable and two variables

Week-6: Multi Body Dynamic Analysis Through MAT Lab Program
Use of MATLAB to solve simple problems in vibration, Mechanism Simulation using multi body dynamic software

Week-7: MAT Lab Program for Euler's Equation of Motion
Solution of Difference Equations using Euler Method

Week-8: MAT Lab Program for Curve Fitting
Determination of polynomial using method of Least Square Curve Fitting.

Week-9: Dynamic Analysis Using MAT Lab Program
Dynamics and vibration analysis

Week-10: MAT Lab Program to Plot the Resultant Acceleration and the Variation of Acceleration
A jet plane is going in a parabolic path described by $y=0.05x^2$. At a point in the path, it has a velocity of 200 m/s, which is increasing at the rate of 0.8 m/s^2. Find the resultant acceleration and plot the variation of acceleration as a function of its horizontal position x.

V. TEXT BOOKS:

1. Delores M.Etter, David C. Kuncicky, HollyMoore, "Introduction to MATLAB7", Pearson Education Inc, 1st edition, 2009.
2. Rao. V. Dukkipati , "MATLAB for ME Engineers" , New Age Science, 1st edition, 2008.
3. Agam Kumar Tyagi, "MATLAB and Simulink for Engineers", Oxford University Press 1st edition, 2012.

VI. WEB REFERENCES:

1. http://www.tutorialspoint.com/matlab/
2. http://in.mathworks.com/products/matlab/?requestedDomain=www.mathworks.com
3. http://www.iare.ac.in