

## COMPUTATIONAL TECHNIQUES LABORATORY

| <b>I SEMSTER: CAD/CAM</b>   |  |                              |   |   |                          |               |     |       |
|---|--|------------------------------|---|---|--------------------------|---------------|-----|-------|
| Course Code   | Category   | Hours / Week                 |   |   | Credits                  | Maximum Marks |     |       |
| BCCB25  | Core   | L                            | T | P | C                        | CIA           | SEE | Total |
|   |  | -                            | - | 3 | 2                        | 30            | 70  | 100   |
| <b>Contact Classes: Nil</b>   | <b>Tutorial Classes: Nil</b>   | <b>Practical Classes: 36</b> |   |   | <b>Total Classes: 36</b> |               |     |       |
| <b>OBJECTIVES:</b>  |  |                              |   |   |                          |               |     |       |
| <b>The courses should enable the students to:</b>   |  |                              |   |   |                          |               |     |       |
| I. Develop MAT LAB programs for simple and complex engineering problems.  |  |                              |   |   |                          |               |     |       |
| II. Interpret the output graphical plots for the given governing equation.  |  |                              |   |   |                          |               |     |       |
| III. Apply the MATLAB programming to real time applications.  |  |                              |   |   |                          |               |     |       |
| <b>LIST OF EXPERIMENTS</b>  |  |                              |   |   |                          |               |     |       |
| <b>Week-1</b>   | <b>INTRODUCTION TO MATLAB PROGRAM</b>  |                              |   |   |                          |               |     |       |
| Applications to MATLAB in Mechanical Engineering.   |  |                              |   |   |                          |               |     |       |
| <b>Week-2</b>   | <b>MATLAB PROGRAM TO PLOT THE INTERNAL FORCES, AND BENDING MOMENT.</b>         |                              |   |   |                          |               |     |       |
| 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 $\alpha$ for $0 < \alpha < 90^\circ$ .   |  |                              |   |   |                          |               |     |       |
| <b>Week-3</b>   | <b>THERMAL STRESS ANALYSIS OF PISTON USING MATLAB PROGRAM</b>                  |                              |   |   |                          |               |     |       |
| Temperature distribution around the given piston dimensions.  |  |                              |   |   |                          |               |     |       |
| <b>Week-4</b>   | <b>FORMULATION OF IDEAL AND REAL GAS EQUATIONS.</b>                            |                              |   |   |                          |               |     |       |
| 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, $m^3 \text{ mol}^{-1}$ R : ideal gas constant, ( $= 8.314 \text{ J}/(\text{mol K})$ ) T : absolute temperature, K |  |                              |   |   |                          |               |     |       |
| <b>Week-5</b>   | <b>USING MATLAB PROGRAM PLOT THE FUNCTION OF ONE VARIABLE AND TWO VARIABLE</b> |                              |   |   |                          |               |     |       |
| Graphing-functions of one variable and two variables  |  |                              |   |   |                          |               |     |       |
| <b>Week-6</b>   | <b>MULTI BODY DYNAMIC ANALYSIS THROUGH MATLAB PROGRAM</b>                      |                              |   |   |                          |               |     |       |
| Use of MATLAB to solve simple problems in vibration, Mechanism Simulation using multi body dynamic software   |  |                              |   |   |                          |               |     |       |
| <b>Week-7</b>   | <b>MATLAB PROGRAM FOR EULERS EQUATION OF MOTION</b>                            |                              |   |   |                          |               |     |       |

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| Solution of Difference Equations using Euler Method.   |  |
| <b>Week-8</b>  | <b>MATLAB PROGRAM FOR CURVE FITTING</b>  |
| Determination of polynomial using method of Least Square Curve Fitting.  |  |
| <b>Week-9</b>  | <b>DYNAMIC ANALYSIS USING MATLAB PROGRAM</b>   |
| Dynamics and vibration analysis  |  |
| <b>Week-10</b>   | <b>MATLAB PROGRAM TO PLOT THE RESULTANT ACCELERATION AND THE VARIATION OF ACCELERATION</b> |
| 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 $0.8 \text{ m/s}^2$ . Find the resultant acceleration and plot the variation of acceleration as a function of its horizontal position $x$ .   |  |
| <b>Reference Books:</b>  |  |
| <ol style="list-style-type: none"> <li>1. Delores M. Etter, David C. Kuncicky , Holly Moore, “Introduction to MATLAB 7”, Pearson Education Inc, 1<sup>st</sup> Edition, 2009.</li> <li>2. Rao. V. Dukkipati , “MATLAB for ME Engineers” , New Age Science, 1<sup>st</sup> Edition, 2008.</li> <li>3. Agam Kumar Tyagi, “MATLAB and Simulink for Engineers”, Oxford University Press 1<sup>st</sup> Edition, 2012.</li> </ol> |  |
| <b>Web References:</b>   |  |
| <ol style="list-style-type: none"> <li>1. <a href="http://www.tutorialspoint.com/matlab/">http://www.tutorialspoint.com/matlab/</a></li> <li>2. <a href="http://in.mathworks.com/products/matlab/?requestedDomain=www.mathworks.com">http://in.mathworks.com/products/matlab/?requestedDomain=www.mathworks.com</a></li> </ol>   |  |