ME655: Rotor Dynamics

<table>
<thead>
<tr>
<th>Teaching Scheme</th>
<th>Credits</th>
<th>Marks Distribution</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>T</td>
<td>P</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Course Content:

1. **Introduction to Vibration and the Laval-Jeffcott Rotor Model:**
   Co-ordinate systems, Steady state rotor motion, Elliptical motion, Single degree of freedom systems, Free and forced vibrations. The two degrees of freedom rotor system, Geared systems, Translational motion, Natural frequencies and Natural modes, Steady state response to unbalance, The effect of flexible support.

2. **Torsional Vibrations of Rotating Machinery:**
   Modeling of rotating machinery shafting, Multi degree of freedom systems, Determination of natural frequencies and mode shapes, Branched systems, Numerical methods for fundamental frequency.

3. **Rigid Rotor Dynamics and Critical Speed:**
   Rigid disk equation - Rigid rotor dynamics, Rigid rotor and flexible rotor, The gyroscopic effect on rotor dynamics, Whirling of an unbalanced simple elastic rotor, Unbalance response, Orbital Analysis and Cascade Plots, Simple shafts with several disks, Effect of axial stiffness, Determination of bending critical speeds, Campbell diagram.

4. **Influence of Bearings on Rotor Vibrations:**
Balancing of Rotors:

Single plane balancing, Multi-plane balancing, Balancing of rigid rotors, Balancing of flexible rotors, Influence coefficient and modal balancing techniques for flexible rotors.

Reference Books: