Dynamics of Machinery

Vibrations: Review of lumped parameter modeling of vibrations, vibrations of continuous systems – bars, beams and plates; Flexural and torsional vibrations, classical and approximate methods of vibration analysis. Vibration isolation of single degree and multidegree freedom systems.

Automatic Control: Control systems, concepts of feed back control; Types of control actions. Effect on control system's performance, state – variable characterization of dynamic systems, Transient and frequency response, stability, Routh and Nyquiest criteria, Root locus method, Application to process and machine tool control; Adaptive control.

Cam Dynamics: Forces in rigid systems, Mathematical models, Response of a uniform motion undamped cam mechanism, Analytical method, Position error, Follower response by phase plane method, Jump and cross over shock, Johnson's numerical analysis, Unstable spring surge and wind up.

Noise Engineering: Fundamentals of sound; Normal Modal Harmonic Analysis, Random aspects of noise; Spectral density; Auto correlation function and their properties; Noise measurement and control.

References:

1. Vibration Problems in Engineering by S. Timoshenko - Wiley Estern
2. Shock and Vibration Handbook by C.M. Harris and C.E. Grede (Ed.) - McGraw Hill
3. Noise and Vibration Control by Leo L. Bernack - McGraw Hill
4. Theory of Vibration and Applications by Thomson W.T. - Prentice Hall