GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

Mechanical Engineering (CAD/CAM)

Subject Name Experimental Modal Analysis and Dynamic Design

Sr.No	Course content
1.	Dynamic test data measurement and processing methods, signature analysis. Frequency response functions for multi-degree-of-freedom systems, free and forced response of structures. Introduction to Modal testing. Orthogonality principle
2.	Modal Analysis techniques: For SDOF systems, Circle fit method – Modal circle, Inverse or line fit method, Calculation of Residual mass and stiffness. Multi degree of freedom methods Non-linear least squares, Rational Fraction Polynomial Method (RFP).
3.	Experimental and theoretical modal analysis algorithms and codes. Applications of modal testing in system and force identification, structural dynamic modification, sensitivity analysis and frequency response coupling of substructure etc
4	Dynamic design of mechanical equipment structures via model testing, Application of Model testing, Modal Assurance Criterion (MAC), structural dynamic modification and model updating techniques like Direct matrix updating, Error matrix method, Inverse Eigen Sensitivity Method (IESM), Response Function Method (RFM). Analysis of beams, 'F' structures for modal analysis
5	Introduction to Non-linear vibration analysis. Introduction to discrete systems and finite element modelling. Comparison of numerical data with test results. Introduction to model updating, Techniques of correlation of analytical and experimental models.

Reference Books:

1. Modal Testing : Theory, Practice and applications by D. J. Ewins, Research Studies Press, U.K.
2. Mechanical Vibrations by Singiresu S. Rao, Pearson Education.
3. Vibration Modal Analysis and parameter identification by Fu Z, Mechanical Industury Publishing Co, China.
4. Vibration Testing Theory & Practice by McConnell K G, John Wiley and Sons.
5. Handbook on Modal Testing, Dynamic Testing Agency.
6. Experimental Methods for Engineers, J. P. Holman, Mc Graw Hill, New York.
7. Vibration Analysis by R. A. Vierck, Harper & Row, New York.