

ME8074 VIBRATION AND NOISE CONTROL

DETAILED SYLLABUS

OBJECTIVE:

- The student will be able to understand the sources of vibration and noise in automobiles and make design modifications to reduce the vibration and noise and improve the life of the components

UNIT I BASICS OF VIBRATION

Introduction, classification of vibration: free and forced vibration, undamped and damped vibration, linear and non-linear vibration, response of damped and undamped systems under harmonic force, analysis of single degree and two degree of freedom systems, torsional vibration, determination of natural frequencies.

UNIT II BASICS OF NOISE

Introduction, amplitude, frequency, wavelength and sound pressure level, addition, subtraction and averaging decibel levels, noise dose level, legislation, measurement and analysis of noise, measurement environment, equipment, frequency analysis, tracking analysis, sound quality analysis.

UNIT III AUTOMOTIVE NOISE SOURCES

Noise Characteristics of engines, engine overall noise levels, assessment of combustion noise, assessment of mechanical noise, engine radiated noise, intake and exhaust noise, engine necessary contributed noise, transmission noise, aerodynamic noise, tire noise, brake noise.

UNIT IV CONTROL TECHNIQUES

Vibration isolation, tuned absorbers, un-tuned viscous dampers, damping treatments, application dynamic forces generated by IC engines, engine isolation, crank shaft damping, modal analysis of the mass elastic model shock absorbers.

UNIT V SOURCE OF NOISE AND CONTROL

Methods for control of engine noise, combustion noise, mechanical noise, predictive analysis, palliative treatments and enclosures, automotive noise control principles, sound in enclosures, sound energy absorption, sound transmission through barriers

TEXT BOOK:

1. Singiresu S. Rao, "Mechanical Vibrations", 6th Edition, Pearson Education, 2016.

REFERENCES:

1. Balakumar Balachandran and Edward B. Magrab, "Fundamentals of Vibrations", 1st Edition, Cengage Learning, 2009
2. Benson H. Tongue, "Principles of Vibrations", 2nd Edition, Oxford University, 2007

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www.AllAbtEngg.com

3. Bernard Challen and Rodica Baranescu - "Diesel Engine Reference Book", Second Edition, SAE International, 1999.
4. David Bies and Colin Hansen, "Engineering Noise Control – Theory and Practice", 4th Edition, E and FN Spon, Taylore & Francise e-Library, 2009
5. Grover. G.T., "Mechanical Vibrations", Nem Chand and Bros., 2009