

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

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| 1. | Title of the Course | Vibrations and Control |
| 2. | Course Number | ME3204 |
| 3. | Status of the Course | Core |
| 4. | Structure of Credits | 3-0-2-4 |
| 5. | Offered To | UG |
| 6. | New Course/Modification to | New |
| 7. | To be Offered by | Department of Mechanical Engineering |
| 8. | To take effect from | July 2018 |
| 9. | Prerequisite | Nil |
| 10. | Whether approved by the Department | Yes |
| 11. | Course Objective: The objective of this course is to enable students to build and solve mathematical models of discrete vibrating systems. The emphasis is on linear systems (Single and Multi degree-of-freedom) subject to initial conditions and excitations of sinusoidal and periodic nature. The course introduces the basics of control mechanisms used in vibrating systems | |
| 12. | Course Content: Introduction to modelling of dynamical systems, assumptions, linearization, stability; Single Degree of Freedom Systems, free undamped vibration, viscous and Coulomb damping, response to initial conditions, response to harmonic and periodic excitations, superposition; Two degree of freedom system, free and forced vibrations, vibration absorber, mode shapes; Vibrations of Torsional systems; Multi degree-of-freedom systems; Introduction to controls, passive and active vibration controls, root locus method, stability, Routh-Hurwitz criterion, steady state errors and constants; Types of feedback control systems, proportional integral derivative feedback compensations, digital control. Laboratory: Free, forced, damped, undamped vibrations; active controls experiments | |
| 13. | Text book(s): 1. Nise N S, <i>Control Systems Engineering</i> , 6th Edition, Wiley (2010). 2. Rao S S, <i>Mechanical Vibrations</i> , 5th Edition, Pearson (2010). | |
| 14. | Reference(s): 1. Ramamurti V, <i>Mechanical Vibrations Practice with Basic Theory</i> , 1st Edition, Narosa (2002). | |