

Year & Sem: E1S2	Course Code: EC3505	Course Name: Micro Electronics and Mechanical Systems	No. of Credits: 4	L 2	T&PS 2	P 0
Unit I: Introduction Micro/Nano Electronics and Mechanical systems, Micro/Nano sensors, Evaluation of MEMS/NEMS, MEMS/NEMS materials, piezo resistive MEMS, cantilever beams Unit II: Fabrication of MEMS/NEMS Fabrication process flow: cleaning, oxidation, patterning, Mask Alignment, Lithography-types, etching-types, annealing, different photo-resists Unit III: Characterization of MEMS/NEMS Characterization of MEMS: Mechanical, Optical and Electrical, Interface electronics to MEMS, wafer bonding, Metallization Unit IV: MEMS/NEMS for Bio-medical applications Introduction to Bio-MEMS/NEMS, issues in Bio-MEMS/NEMS, Introduction to Micro fluidics, Application of Bio-MEMS Unit V: Introduction to lab-on-chip Nanotribology and Nanomechanics Issues, Nanotribological Studies of MEMS/NEMS Materials, Lab-on-chip Unit VI: Application of MEMS/NEMS MEMS for Space applications, MEMS for thermal applications, Pressure sensors, MEMS gyro sensors, MEMS capacitive accelerometer References/Text Books: 1. "Microsystem Design" by Stephen D. Senturia, Kluwer Academic Publishers, 2001. 2. Fundamentals of Microfabrication by Marc Madou, CRC Press, 1997, ISBN 0-8493-9451-1. 3. "Microsensors" by Richard S. Muller, Roger T. Howe, Stephen D. Senturia, Rosemary L. Smith, and Richard M. White, IEEE Press, IEEE Number PC 0257-6, ISBN 0-87942-254-9, New York, 1991. 4. Micromechanical Transducers: Pressure sensors, accelerometers, and gyroscopes by M.-H. Bao, Elsevier, New York, 2000. 5. Micromachined Transducers Sourcebook by Gregory Kovacs, WCB McGraw-Hill, Boston, 1998, ISBN 0-07-290722-3. 6. "Micromechanics and MEMS: Classic and Seminal Papers to 1990. " by William Trimmer, IEEE Press, IEEE Number PC4390, ISBN 0-7803-1085-3, New York. Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations. Video Lectures (Web Links): 1. http://nptel.ac.in/courses/112104181/ 2. http://nptel.ac.in/courses/117105082/ Study Materials (Web Links): 1. 2.						