DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**M. Tech , Process Control and Instrumentation**		
Course Title	**Measurement system**		
Course Code	**CL 651A**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**Nil**		
Session	**July 2020**	**Section**	**-**
Name of Faculty	**Dr. G. Uma**	**Department**	**ICE**
Official Email	**guma@nitt.edu**	**Telephone No.**	**0431-2503359**
Name of Course Coordinator(s)	**NA**		
Official E-mail	**guma@nitt.edu**	**Telephone No.**	**9443454987**
Course Type (please tick appropriately**)**	**Core course**		

Syllabus (approved in BoS)

General concepts and terminology of measurement systems, static and dynamic characteristics, errors, standards and calibration.
Introduction, principle, construction and design of various active and passive transducers. Introduction to semiconductor sensors and its applications; Design of signal conditioning circuits for various Resistive, Capacitive and Inductive transducers and piezoelectric transducer.

Introduction to transmitters, two wire and four wire transmitters, Smart and intelligent Transmitters. Design of transmitters.

Introduction to EMC, interference coupling mechanism, basics of circuit layout and grounding, concept of interfaces, filtering and shielding.

Introduction to safety, electrical hazards, hazardous areas and classification, non-hazardous areas, enclosures – NEMA types, fuses and circuit breakers. Protection methods: Purging, explosion proofing and intrinsic safety.

Reference Books :

1. John P. Bentley, Principles of Measurement Systems, Pearson Education, 4th Edition, 2005.

2. Doebelin E.0, Measurement Systems - Application and Design, McGraw-Hill, 4th Edition, 2004.

3. S.M. Sze, Semiconductor sensors, John Wiley & Sons Inc., 1994.

4. B.C.Nagra And K.K Chaudry, Instrumentation Measurement and Analysis.

COURSE OBJECTIVES

1. To expose the students to various sensors and transducers for measuring mechanical quantities.
2. To make the students familiar with the specifications of sensors and transducers.
3. To teach the basic conditioning circuits for various sensors and transducers.
4. To introduce about advancements in sensor technology.
5. To expose the students to EMI,EMC and safety practices

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Course Outcomes On completion of the course, the student will be able to,	**Programme Outcomes (PO)** **(**Enter Numbers only**)**
1. Familiar with the basics of measurement system and its input, output configuration of measurement system.	1,2
2. Familiar with both static and dynamic characteristics of measurement system	1,2
3. Familiar with the principle and working of various sensors and transducers.	1,2
4. Able to design signal conditioning circuit for various transducers.	1,2
5. Able to identify or choose a transducer for a specific measurement application.	1,2
6. Familiar with EMI, EMC concepts and safety practices.	3,4

COURSE PLAN – PART II			
COURSE OVERVIEW			
The course consist of basic concepts of Measurement system, its characteristics and its design, with emphasis on different type's transducers and its conditioning circuits. Basic introduction to Micro sensors, its fabrication and flexible sensors is also covered. Safety, EMI and EMC is also covered.			
COURSE TEACHING AND LEARNING ACTIVITIES			
S. No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
1	21.9.2020 to 10.10.2020	General concepts of design of measurement system and its characteristics	Online session
2	12.10.2020 to 30.10.2020	Introduction, principle and construction of various widely used Transducers	Online session Discussion and presentation by students.
3	02.11.2020 to 20.11.2020	Design of signal condition circuits for various transducers and selection of Transducers	Online session Discussion and presentation by students.
4	23.11.2020 to1.12.2020	Transmitters, EMI ,EMC and Safety	Online sessions Presentation by students
5	2.12.2020 to 17.12.2020	Introduction to Semiconductor sensors, materials, scaling issues and its fabrication and design tools. Brief discussion on smart sensors and flexible sensors. Trends in sensor technology	Online sessions

COURSE ASSESSMENT METHODS (shall range from 4 to 6**)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Assessment I Online	3rd week of Oct 2020	1 hour	15%
2	Assessment II Online	3rd week of Nov 2020	1 hour	15%
3	Assessment III Assignment, Presentation, Viva Voce and Class participation (online)	Continuous Throughout the semester	NA	40%
	Compensation Assessment* (online)	Week before final Assessment	1 hour	15%
4	Final Assessment * (online)	4th week of Dec 2020	2 hours	30%

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

Feedback from students will be obtained during the course Students' performance in test and their presentation during discussion will be used to assess the understanding level.

COURSE POLICY (including compensation assessment to be specified**)**

1.75% of attendance is must, inclusive of On duty on any grounds. 5% of relaxation can be considered on medical grounds. Students not acquiring the required attendance will be assigned V grade.
2. Relative grading with passing minimum of 40 % or clustering will be followed, on seeing the overall performance of the students and if the class strength is less than 10 absolute grading policy will be followed.
3. For the students missing the assessment for medical reasons, one compensation assessment will be conducted one week before the final assessment for a weightage, equal to that of the missed assessments. But students are advised not to miss the assessments.
4 For the students not passing the course, reassessment will be conducted during the first week of next semester for a weightage of 100% and the grades will be given on absolute grading policy.
6. For academic dishonesty institute policy will be followed. As assessments are happening online students are advised not to practice copying, plagiarism check will be happening.

FOR APPROVAL

Course Faculty _____	**CC- Chairperson** _____	**HOD** _____
	K Muthukumar	