NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF PRODUCTION ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**B.Tech. Production Engineering**		
Course Title	**METROLOGY (Theory & Lab)**		
Course Code	**PRPC18**	**No. of Credits**	**03**
Course Code of Prerequisite subject(s)	**PHIR12**		
Session	**January 2019**	**Section (if, applicable)**	**B**
Name of Faculty	**Dr. D. Lenin Singaravelu**	**Department**	**Production Engineering**
Official Email	**dlenin@nitt.edu**	**Telephone No.**	**0431-2503522**
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		**Telephone No.**	
Course Type (please tick appropriately)	[√] **Core course** [ ] **Elective course**		

Syllabus (approved in BoS)

Introduction to Measurement – objectives – classification of methods of measurements - Precision and Accuracy - Standards and their evolution -Types of errors in measurements – Limit gauging Comparators – types – applications – Linear, angular and form measurements – Surface roughness methods of surface finish – Direct instrument measurements.

Screw Thread Measurement- Standard thread profiles, Effective diameter, Terminology of gear tooth – Gear measurement – Parkinson gear tester- Alignment testing of machine tools – Coordinate measuring machines – Machine vision – Nano measurements.

Measurement of field quantities like temperature, pressure, velocity by intrusive and non-intrusive techniques under various conditions met with in practice like steady and transient conditions. Measurement of derived quantities like heat flux, volume/mass flow rate, temperature in flowing fluids. Measurement of thermo-physical properties, radiation properties of surfaces, vibration and noise. Measurement of length, measurement of angle. Limits and fits.

LAB EXERCISES

Study and use of Electronic comparator - Profile projector - sine bar - precision measuring instruments -coordinate measuring machine Measurement of Gear tooth thickness - Adjacent base pitch error – surface roughness.

COURSE OBJECTIVES
• To provide knowledge on the various measurement techniques with practical examples. • To induce students to apply the correct method of testing and inspection by providing case studies. • To promote the use of statistical tools for enhancing the quality of the product.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
Students can demonstrate different measurement technologies	1, 2
Apply the instruments for the components provided	4
Application of proper techniques for the given case studies	4,6
Familiar with the engineering analysis of quality inspection	7,9
Accurate measurements of the components given	11

COURSE PLAN – PART II

COURSE OVERVIEW

The dimensional control is the prime need for the product's defect free working. Hence metrology is the science of measurement, embracing both experimental and theoretical determinations at any level of uncertainty in any field of science and technology. To provide positive solutions for the uncertainty, the statistical inferences for the measurements is needed. The course metrology thus provides an overview about measurements, techniques, errors, precision, accuracy, statistical tools for quality.

COURSE TEACHING AND LEARNING ACTIVITIES (Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1	Introduction to Measurement	Lecture - C&T/ PPT, Discussions, Video – 2 Hrs Practical – 2 Hrs
2		Objectives of Measurement	
3		Classification of methods of measurements - Precision and Accuracy	
4		Standards and their evolution of errors in measurements	
5	Week 2	Types of errors in measurements	
6		Limit gauging	
7		Introduction of Comparators and applications	
8		Comparator types	

9	Week 3	Linear measurements	Lecture - C&T/ PPT, Discussions, Video – 2 Hrs Practical – 2 Hrs
10		Angular and form measurements	
11		Surface roughness methods of surface finish	
12		Direct instrument measurements	
	Week 4	**Cycle test 1**	
13		Screw Thread Measurement	
14		Standard thread profiles	
15		Effective diameter, Terminology of gear tooth	
16		Gear measurement – Parkinson gear tester	
17	Week 5	Alignment testing of machine tools	
18		Coordinate measuring machines	
19		Machine vision	
20		Nano measurements	
21	Week 6	Measurement of field quantities - temperature	
22		Measurement of field quantities - pressure	
23		Measurement of field quantities - velocity by intrusive	
24		Measurement of field quantities - velocity by non-intrusive techniques	
	Week 7	**Cycle test 2**	
25		Measurement of derived quantities - heat flux, volume in flowing fluids	
26		Measurement of derived quantities - mass flow rate, temperature in flowing fluids	
27		Measurement of thermo-physical properties	
28		Radiation properties of surfaces	
29	Week 8	Vibration and noise	
30		Measurement of length, measurement of angle	
31		Limits and fits	
32		Study and use of Electronic comparator	
33	Week 9	Profile projector	
34		Sine bar	
35		Precision measuring instruments	
36		Coordinate measuring machine Measurement of Gear tooth thickness	
37	Week 10	Adjacent base pitch error	
38		Surface roughness	

COURSE ASSESSMENT METHODS (shall range from 4 to 6**)**				
S.No.	**Mode of Assessment**	**Week/Date**	**Duration**	**% Weightage**
1	Cycle Test 1	Week 4	1 hour	20
2	Cycle Test 2	Week 7	1 hour	20
3	Assignment- 1	Week 3	1 week	5
4	Assignment-2	Week 6	1 week	5
CPA	Compensation Assessment*	Week 10	1 Week	20
5	Final Examination - Theory	Week 11	3 hours	50
6	Final Examination – Practical	Week 11	2 hours	100
			Total (75% Theory+25% Practical)	100 marks

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

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

l. Class committee meetings
2. Feedback through MIS

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

- A student should complete all necessary examination stated above including compensation assessment with a minimum of 35% should be scored by the candidate in order to complete the course.
- Relative grading will be followed for the course.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

Contact the Course Teacher: Dr. D. Lenin Singaravelu
Room No.: MTB307 / Second Floor / Manufacturing Technology Building
Timings: Office Hours
Email ID: dlenin@nitt.edu
Telephone No.: 0431-250-3522

FOR APPROVAL

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

Guidelines

a) The number of assessments for any theory course shall range from 4 to 6.

b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.

c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.

f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.

g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.