NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF CHEMICAL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**M.Tech. I YEAR (I SEMESTER) CHEMICAL ENGINEERING (PCI) PROGRAMME**		
Course Title	**ANALYTICAL INSTRUMENTATION**		
Course Code	**CL667**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**NONE**		
Session	**July – 2020**	**Section (if, applicable)**	**Not Applicable**
Name of Faculty	**Dr. Jyoti Sahu**	**Department**	**Chemical Engineering**
Official Email	**jyoti@nitt.edu**	**Telephone No.**	**-**
Name of Course Coordinator(s) (if, applicable)	**NA**		
Official E-mail	**NA**	**Telephone No.**	**NA**
Course Type (please tick appropriately**)**	**✓ Core course**	**Elective course**	

Syllabus (approved in BoS)

UNIT 1- Electromagnetic radiation, Characteristics - Interaction of e.m. radiation with matter - Spectral methods of analysis - absorption spectroscopy - Beer's law - radiation sources - monochromators and filters - diffraction grating - ultraviolet spectrometer - single beam and double beam instruments.

UNIT 2- Particles emitted in radioactive decay - nuclear radiation detectors - injection chamber - Geiger - Muller counter - proportional counter - scintillation counter - Semiconductor detectors.

UNIT 3- Measurement techniques for water quality parameters - conductivity - temperature - turbidity. Measurement techniques for chemical pollutants - chloride - sulphides - nitrates and nitrites - phosphates - fluoride - phenolic compounds.

UNIT 4- Air pollution: its effect on environment, its classification, Measurement techniques for particulate matter in air. Measurement of oxides of sulphur, oxides of nitrogen unburnt hydrocarbons, carbon- monoxide, dust mist and fog.

UNIT 5- Noise pollution: basics of sound pollution, its effect to environment, measurement of sound, tolerable levels of sound. Measurement of sound level. Measurement techniques for soil pollution.

TEXT BOOKS:

1. H.H. Willard, Merrit and Dean, Instrumental Methods of Analysis, 5th Edn., 1974.
2. R.K. Jain, Fundamentals of Mechanical and Industrial Instrumentation",1999.

REFERENCES:

1. S.P. Mahajan, Pollution Control in Process Industries, Tata McGraw Hill, 2004.
2. G. N. Pandey and G.C. Carney, Environmental Engineering, Tata McGraw-Hill, 2004.

COURSE OBJECTIVES

To understand different instrumentation techniques for measurement of environmental parameters

MAPPING OF COs with POs

Course Outcomes	**Programme Outcomes (PO)** (Enter Numbers only)
After completing the course, the students should be able to understand spectral methods, methods for water quality, air quality, sound and soil pollution.	**PO4 to PO10, PO12**

COURSE PLAN – PART II

COURSE OVERVIEW

The course aims to provide fundamental insights to Instrumentation Techniques. The course introduces working principle of various instruments and its industrial applications. These techniques can be used as measurement techniques for environment pollution such as water pollution, air pollution, sound pollution and soil pollution. The course majorly focusses on the techniques and its applications which allows students to gain practical knowledge rather than mere theory.

COURSE TEACHING AND LEARNING ACTIVITIES (Add more rows)

S.No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
1	WEEK 1	Electromagnetic radiation, Characteristics	ONLINE PRESENTATION SLIDES AND VIDEOS
2	WEEK 2	Interaction of e.m. radiation with matter, Spectral methods of analysis - absorption spectroscopy	ONLINE PRESENTATION SLIDES AND VIDEOS
3	WEEK 3	Beer's law - radiation sources - monochromators and filters - diffraction grating	ONLINE PRESENTATION SLIDES AND VIDEOS
4	WEEK 4	ultraviolet spectrometer - single beam and double beam instruments.	ONLINE PRESENTATION SLIDES AND VIDEOS
5	WEEK 5	Particles emitted in radioactive decay - nuclear radiation detectors	ONLINE PRESENTATION SLIDES AND VIDEOS

6	WEEK 6	injection chamber - Geiger - Muller counter - proportional counter, Scintillation counter - Semiconductor detectors.	ONLINE PRESENTATION SLIDES AND VIDEOS
7	WEEK 7	Measurement techniques for water quality parameters - conductivity - temperature - turbidity.	ONLINE PRESENTATION SLIDES AND VIDEOS
8	WEEK 8	Measurement techniques for chemical pollutants - chloride - sulphides - nitrates and nitrites - phosphates - fluoride - phenolic compounds.	ONLINE PRESENTATION SLIDES AND VIDEOS
9	WEEK 9	Air pollution: its effect on environment, its classification, Measurement techniques for particulate matter in air.	ONLINE PRESENTATION SLIDES AND VIDEOS
10	WEEK 10	Measurement of oxides of sulphur, oxides of nitrogen unburnt hydrocarbons, carbon- monoxide, dust mist and fog	ONLINE PRESENTATION SLIDES AND VIDEOS
11	WEEK 11	Noise pollution: basics of sound pollution, its effect to environment, Measurement of sound level, tolerable levels of sound,	ONLINE PRESENTATION SLIDES AND VIDEOS
12	WEEK 12	Measurement techniques for soil pollution.	ONLINE PRESENTATION SLIDES AND VIDEOS

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

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment-1	Week 2	-	10%
2	Seminar Presentation	Week 3-4	40 min	10%
3	Online Classtest-1	Week 6	1 hr	20%
4	Assignment-2	Week 8	-	10%
5	Online Classtest-2	Week 10	1 hr	20%
CPA	Compensation Assessment*	Week 13	1 hr	20%

6	Final Assessment *	Week 15	2 hr	30%

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

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

RATE THE COURSE OUT OF 5 –
GRADE YOU OBTAINED -
POINTS TO BE ADDED FOR THE IMPROVEMENT-

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

Student`s involvement during class; Compensation assessment; Academic honesty and plagiarism etc.

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

NA

FOR APPROVAL

Course Faculty	Jyoti Sahu	**CC- Chairperson**	K Muthukumar 26 October 2020	**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.

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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.