

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ENERGY AND ENVIRONMENT

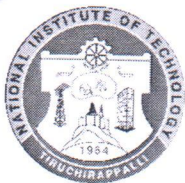
COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech Energy Engineering		
Course Title	Wind Energy and Hydro Power systems		
Course Code	EN 646	No. of Credits	3
Course Code of Pre-requisite subject(s)			
Session	January 2019	Section (if, applicable)	NA
Name of Faculty	Mr.Ramesh R	Department	DEE
Official Email	rramesh@nitt.edu	Telephone No.	0431-2503135
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	Core course	<input checked="" type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
Measurement and instrumentation – Beau fort number -Gust parameters – wind type – power law index -Betz constant -Terrain value.			
Energy in wind– study of wind applicable Indian standards – Steel Tables, Structural Engineering.Variables in wind energy conversion systems – wind power density – power in a wind stream– wind turbine efficiency – Forces on the blades of a propeller – Solidity and selection curves.			
HAWT, VAWT– tower design-power duration curves- wind rose diagrams- study of characteristics- actuator theory- controls and instrumentations.			
Grid-combination of diesel generator- Battery storage - wind turbine circuits - Wind farms -fatiguestress.			
Overview of micro mini and small hydro, Site selection and civil works, Penstocks and turbines, Speed and voltage regulation, Investment issues, load management and tariff collection			
Distribution and marketing issues, case studies, Wind and hydro based stand-alone / hybrid power systems, Control of hybrid power systems, Wind diesel hybrid systems.			



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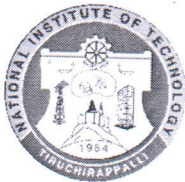
COURSE OBJECTIVES	
1.	To outline the various parameters and variables in wind energy conversion.
2.	To introduce the concepts of measurement and instrumentation in wind power systems.
3.	To become familiar with the design of wind tower/wind turbine for particular location.
4.	To impart the basics of hydropower systems.
5.	To realize the need for hybrid power systems.
MAPPING OF COs with POs	
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. To estimate the power generation capacity of wind turbine	1,2,3,7 and 12
2. To analyze the variables of wind energy conversion.	
3. Design a suitable wind energy conversion system for a particular location	
4. Describe the working of hydro power systems.	
5. Compare hybrid power systems and standalone systems.	

COURSE PLAN – PART II			
COURSE OVERVIEW			
<p>This course aims at providing (i) the basic principles of wind energy conversion systems, its design, operation, control and instrumentations. (ii) Overview of hydro power systems and control of hybrid power systems.</p>			
COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1	Power law Index ,Betz constant derivation, Gust Parameters	Lecture
2	2	Beaufort Number, Wind Types, terrain Value, Measurement and instrumentation	Lecture/PPT
3	3	Variables in wind energy conversion, energy available in wind, wind power density	Lecture
4	4	Wind turbine efficiency, Forces on the blades of propeller-derivations& Problems. Solidity and selection curves	Lecture/Tutorial (One hr for cycle test – I)



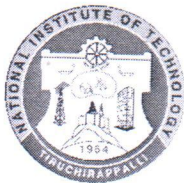
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5	5	Study of wind applicable Indian standards, Steel Tables, Structural Engineering	Lecture/PPT (One hr for Seminar)	
6	6	Power duration Curves, Wind Rose diagrams, Actuator theory	Lecture	
7	7	HAWT, VAWT, Tower Design and its related instrumentation.	Lecture/PPT	
8	8	Wind turbine Circuits, Wind Farms	Lecture/PPT (One hr for cycle test – II)	
9	9	Battery storage, Grid combination with diesel generator	Lecture (One hr for Seminar)	
10	10	Introduction, basics and types of hydro power systems	Lecture	
11	11	Site selection, Penstocks, speed and voltage regulation, Investment Issues, Load Management, Tariff collection	Lecture	
12	12	Wind and hydro based stand-alone/hybrid power systems, Control of hybrid power systems	Lecture	
13	13	Wind diesel Hybrid systems, Distribution and marketing issues	Lecture (One hr for Group Discussion)	
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	CYCLE TEST 1	Feb second week	1 hr	20
2	CYCLE TEST 2	March last week	1 hr	20
3	ASSIGNMENT	March first week		10
4	CASESTUDY	April second week		10
CPA	Compensation Assessment*	April third week	1 hr	20



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5	Final Assessment *		2 Hrs	40
*mandatory; refer to guidelines on page 4				
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
Feedback is obtained by the institute through MIS				
COURSE POLICY (including compensation assessment to be specified)				
Students are encouraged to meet in my cabin MN002, DEE main building or communicate through mail address ramesh@nitt.edu				
<u>COMPENSATION ASSESSMENT</u>				
Compensation assessment will be conducted only for students who miss the CYCLE TEST-I/II on valid/genuine grounds of medical or other emergencies.				
<u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)				
<ul style="list-style-type: none">➤ 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.				
<u>ACADEMIC DISHONESTY & PLAGIARISM</u>				
<ul style="list-style-type: none">➤ 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				
FOR APPROVAL				
Course Faculty <u>Ramesh.R</u> CC- Chairperson <u>N. Arun</u> HOD <u>N. Arun</u>				



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Guidelines

- The number of assessments for any theory course shall range from 4 to 6.
- Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- 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%

- Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- Necessary care shall be taken to ensure that the course plan is reasonable and is objective.