DEPARTMENT OF MECHANICAL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	**M.TECH. THERMAL POWER ENGINEERING**		
Course Title	**ANALYSIS OF THERMAL POWER CYCLES**		
Course Code	**ME 635**	**No. of Credits**	**03**
Course Code of Pre-requisite subject(s)	**NIL**		
Session	**JANUARY 2021**	**Section (if, applicable)**	**NA**
Name of Faculty	**M.UDAYAKUMAR**	**Department**	**MECHANICAL ENGINEERING**
Email	**muday@nitt.edu**	**Telephone No.**	**9487257871**
Course Type	☑ **Core course**	☐ **Elective course**	

Syllabus (approved in BoS)

Steam power plant cycle - Rankine cycle - Reheat cycle - Regenerative cycle with one and more feed heaters - Types of feed heaters - Open and closed types - Steam traps types.

Cogeneration - Condensing turbines - Combined heat and power - Combined cycles - Brayton cycle Rankine cycle combinations - Binary vapour cycle.

Air standard cycles - Cycles with variable specific heat - fuel air cycle - Deviation from actual cycle.

Brayton cycle - Open cycle gas turbine - Closed cycle gas turbine - Regeneration - Inter cooling and reheating between stages.
Refrigeration Cycles - Vapour compression cycles - Cascade system - Vapour absorption cycles - GAX Cycle.

COURSE OBJECTIVES

1. To describe sources of energy and types of power plants.
2. To analyze different types of steam cycles and estimate efficiencies in a steam power plant.
3. To define the performance characteristics and components of power plants.
4. To study and analyse various refrigeration cycles

COURSE OUTCOMES (CO)

Course Outcomes	**Aligned Programme Outcomes (PO)**
1. To describe sources of energy and types of power plants.	1, 2, 3, 4
2. To analyze different types of steam cycles and estimate efficiencies in a steam power plant	1, 2, 4, 5, 6
3. To define the performance characteristics and components of IC engine and gas turbine power plants	3, 4, 5, 6, 8
4. To study and analyse different types of refrigeration cycles	6, 7, 8, 9, 10

COURSE PLAN – PART II			
COURSE OVERVIEW			
Equip students with analytical ability to thoroughly analyse different types of power plant cycles and refrigeration cycles.			
COURSE TEACHING AND LEARNING ACTIVITIES			
Topic No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
1	Week 1	Introduction to Thermal power cycles and refrigeration cycles, Simple Rankine cycle, efficiency, Rankine cycle vs Carnot cycle, Reheat cycle, Analysis of Reheat cycle, problems	Online Lecture With PPT presentation
2	Week 2	Principle of regeneration, disadvanages of ideal regeneration, feed heaters and their types, Cycles with 1,2 and 3 feed heaters	Online Lecture With PPT presentation
3	Week 3	NPTEL problem solving for 2 closed feed heater RG Rankine cycle. Characteristics of cycles with open and closed feed heaters. Combined cycles, ideal efficiency of combined cycles	Online Lecture With PPT presentation
4	Week 4	GT topping and Rankine bottoming cycle efficiency, problem solving , combined heat and power(Cogeneration) – types, condensing and back pressure turbines, Problem	Online Lecture With PPT presentation
5	Week 5	Problem solving for different CHP applications	Online Lecture With PPT presentation
6	Week 6	**TEST-1**, IC engines- review, Analysis of Air standard cycles, fuel-air cycles, comparison with actual cycles,	Online Lecture With PPT presentation
7	Week 7	Brayton cycles, efficiency of reheat and RG cycles. Problems	Online Lecture With PPT presentation
8	Week 8	Analysis of different types of refrigeration cycles	Online Lecture With PPT presentation
9	Week 9	Case study Seminars: **TEST-2**	Online With PPT presentation
10	Week 10	Binary vapour cycle. Seminars	Online Lecture With PPT presentation

11	Week 11	Seminars	Online With PPT presentation
12	Week 12	Seminars	Online With PPT presentation
13	Week 13	Seminars	Online With PPT presentation

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week / Date of assignment	Duration	% Weightage
1	I- Cycle Test	6th Week	1 Hour	25
2	II- Cycle Test	10th Week	1 Hour	25
3	Seminars	12th week onwards	Each student 20 min presentation	20
CPA	Compensation Assessment*	Before End semester	1 Hour	Corresponding weightage
4	End semester	15	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)

- Students can meet the faculty at any stage in the course duration in case he/she finds difficulty in understanding the concept.
- Feedback form issued to students to express their comments about the course after completing the syllabus. Students are requested to give genuine feedback about the course.
- Student knowledge about the topic covered in this course will be judged during continuous assessments based on the marks obtained in the written examination.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

- Students must attend all the classes regularly.
- Students should present individual seminars using ppt as per the given instructions at the class. Postponement of presentation is not permitted.
- The Institute follows relative grading with flexibility given to teachers to decide the mark ranges for grades.
- All assessment of this course will be done on the basis of marks.

MODE OF CORRESPONDENCE (email/ phone etc.)

Email: muday@nitt.edu **Mobile: 9487257871**

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

The Course Instructor is available for consultation at all times over mobile/ phone or over email.

Text Book Reference:

1. Culp, R., Principles of Energy Conversion, McGraw-Hill, 2000.
2. Nag. P.K., Power Plant Engineering, 2nd Tata McGraw-Hill, 2002.
3. Nag. P.K., Engineering Thermodynamics, 3rd ed., Tata McGraw-Hill, 2005.
4. Arora, C.P., Refrigeration and Air Conditioning, 2nd ed., Tata McGraw-Hill, 2004.

FOR APPROVAL

Dr. M. UDAYAKUMAR **Course Faculty**	**Dr. T. RAMESH** **CC-Chairperson**	**Dr. AR VEERAPPAN** **HOD**

Guidelines:

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

b) Every 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.