BBS College of Engineering & Technology, Prayagraj
Lecture Plan

Department:	Mechanical Engineering
Program / Session / Year / Semester:	B. Tech. /2024-25 / 2nd / 4th .
Course Name:	Applied Thermodynamic
Course Code:	BME-401
Name of Faculty:	Dr. Atiqur Rehman
Department of Faculty:	Department of Mechanical Engineering
Type of Course:	Theory
Number of Lecture Proposed:	58

Pre-requisites for the Course

Students should have interest in learning basics of Air Standard Cycle and Its Importance in mechanical engineering.
Student should have interest in learning about Vapour Power Cycle, Steam Turbine, Gas turbine, and also learning how the Fuel, Boiler, Condenser, Nozzle works and its importance.

Course Outcomes (COs)

At the end of this course students will demonstrate the ability to:

CO1 To learn about Air Standard Cycle.
CO2 To learn about of I law for reacting systems and heating value of fuels.
CO3 To learn about gas and vapor cycles
CO4 To learn about gas dynamics of air flow and steam through nozzles.
CO5 To analyze the performance of steam turbines

Unit	Topic & sub–topic (as per University Syllabus)	Topics Covered	COs	Lectures proposed	No of Lecture delivered	Date	No. of student's present
	Unit -1: Introduction to Air Standard Cycle						
1	Otto Cycle		CO1	1			
	Diesel cycle		CO1	2			
	Dual cycles and Analysis		CO1	2			
	Introduction to Turbocharger & Supercharger.		CO1	3			
	Tentative no of Lectures Required to complete the Unit-1			**08**			
2	**Unit-2: Vapour Power Cycles & Fuels and Combustion**						
	Vapor power cycles, Rankine cycle with superheat, reheat and regeneration, exergy analysis.		CO2	2			
	Rankine cycle, effect of pressure and temperature on Rankine cycle,		CO2	2			
	Reheat cycle, Regenerative cycle, Feed water heaters.		CO2	2			
	Binary vapour cycle, Combined cycles, Cogeneration.		CO2	2			
	Fuels and Combustion: Combustion analysis, heating values.		CO2	1			
	Air requirement, Air/Fuel ratio, standard heat of reaction and effect of temperature on standard heat of reaction,		CO2	2			
	Heat of formation, Adiabatic flame temperature.		CO2	1			
	Tentative no of Lectures Required to complete the Unit-2			**12**			

3	**Unit-3: Boiler & Condenser**						
	Boilers: Classifications and working of boilers, boiler mountings and accessories,		CO3	2			
	Draught and its calculations.		CO3	2			
	Air pre-heater, feed water heater, super heater.		CO3	2			
	Boiler efficiency, Equivalent evaporation.		CO3	2			
	Boiler trial and heat balance.		CO3	2			
	Condenser: Classification of condenser,		CO3	1			
	Air leakage, condenser performance parameters		CO3	2			
	Tentative no of Lectures Required to complete the Unit-3			**13**			
4	**Unit-4: Steam and Gas Nozzles**						
	Steam and Gas Nozzles: Flow through Convergent and convergent-divergent nozzles, variation of velocity, area and specific volume, choked flow, throat area, Nozzle efficiency.		CO4	3			
	Off design operation of nozzle, Shock waves stationary normal shock waves, Effect of friction on nozzle, Super saturated flow.		CO4	3			
	Steam Turbines: Classification of steam turbine, Impulse and Reaction turbines,		CO4	1			
	Staging, Stage and Overall efficiency, reheat factor, Bleeding.		CO4	2			
	Velocity diagram of simple and compound multistage impulse and reaction turbines and related calculations, work done, efficiencies of reaction.		CO4	2			
	Impulse reaction turbines, state point locus, Losses in steam turbines, Governing of turbines, Comparison with steam engine.		CO4	2			
	Tentative no of Lectures Required to complete the Unit-4			**13**			
5	**Unit-5: Gas Turbine and Jet Propulsion**						
	Gas Turbine: Gas turbine classification, Brayton cycle, Principles of gas turbine,		CO5	2			
	Gas turbine cycles with intercooling, reheat and regeneration and their combinations,		CO5	3			
	Stage efficiency, Polytropic efficiency. Deviation of actual cycles from ideal cycles.		CO5	2			
	Jet Propulsion: Introduction to the principles of jet propulsion,		CO5	1			
	Turbojet and turboprop engines and their processes,		CO5	2			
	Principle of rocket propulsion, Introduction to Rocket Engine.		CO5	2			
	Tentative no of Lectures Required to complete the Unit-5			**12**			

Text Books & References	
1.	Basic and Applied Thermodynamics by P.K. Nag, Mcgraw hill India.
2.	2. Applied thermodynamics by Onkar Singh, New Age International.
3.	3. Applied Thermodynamics for Engineering Technologists by Eastop, Pearson Education.
	4. Applied Thermodynamics by Venkanna And Swati, PHI.
	5. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley
4.	6. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India
	8. Theory of Stream Turbine by WJ Kear

Signature of Faculty Signature of HOD

Comments	