

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Diploma Engineering				Branch		Automobile	
Semester		IV				Version		1.0.0.0	
Effective from Academic Year			2019-20			Effective for the batch Admitted in			June 2018
Subject code		1AU2406		Subject Name		Thermodynamics & Hydraulics			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:
Students must have knowledge of concepts of thermal energy, properties of liquids and gases. Students must aware with Fluid, its related concepts & Fluid control system.

Course Learning Outcomes:
The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:
<ul style="list-style-type: none"> To understand the basics of thermodynamics. To analyse the thermodynamic principles. To apply thermodynamic cycles with P-V and T-S diagrams. To understand Fluid & its related concepts. To develop hydraulic devices like pumps based on fluid laws.
The tutorial should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate course learning outcomes.

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 BASIC OF THERMODYN AMICS	1.1. Thermodynamic system 1.2. Properties of substance like Pressure, temperature, volume, heat, work, energy. 1.3 Thermodynamic processes & cycles 1.4 Work and heat transfer i Difference between heat and work ii Understanding of work transfer, displacement work, other types of work transfer- electric work, shaft work, pedal(stirring) work, flow work iii Heat transfer, specific heat, latent heat 1.5 Various forms of energy like static energy, kinetic energy,	1a.Explain common terms related to thermodynamic System. 1b.Describe the properties of system, form of energy, Work and heat. 1c. Explain concept of enthalpy And entropy.	8	6

	<p>potential energy internal energy, enthalpy etc.</p> <p>1.6 Concept of enthalpy and entropy</p>			
<p>UNIT – 2 LAWS OF THERMODYNAMICS</p>	<p>2.1. Zeroth Law of Thermodynamics</p> <p>2.2 First Law of Thermodynamics, its limitations & Application to flow Processes. (No numerical)</p> <p>2.3 Second law of Thermodynamics Kelvin Planck & Claudius statements, Refrigerator & heat Pump.</p> <p>2.4 Concept of Reversible and Irreversible Processes.</p> <p>2.5 Heat Engine</p> <p>2.6 Concept of Available energy referred to a cycle</p>	<p>2a. Describe various laws of thermodynamic to different Situation.</p> <p>2b. Describe Reversible and Irreversible processes.</p> <p>2c. Explain working principles of heat engine.</p>	8	6
<p>UNIT – 3 IDEAL GASES AND PROCESSES</p>	<p>3.1 Ideal gas laws and equation</p> <p>3.2 Specific heat of ideal gas</p> <p>3.3 Various thermodynamic processes like constant pressure, constant volume, constant temperature etc.</p>	<p>3a. Explain ideal gas laws and Thermodynamic processes.</p> <p>3b. Draw thermodynamic processes on P-V & T-S Diagram.</p> <p>3c. Various thermodynamic processes like constant pressure, constant volume, constant temperature etc.</p>	8	6
<p>UNIT – 4 THERMODYNAMIC CYCLES</p>	<p>4.1 Different air standard cycles and their importance- Carnot cycle, Otto cycle, Diesel cycle, Dual cycle.</p> <p>4.2 Determine work done and efficiency of above cycles.</p> <p>4.3 Applications of different Thermodynamic cycles.</p>	<p>4a. Describe operation of Thermodynamic cycles And their importance.</p> <p>4b. Calculate work done and efficiency of different thermodynamic cycles for a given data.</p>	10	8
<p>UNIT – 5 FUNDAMENTALS OF HYDRAULICS</p>	<p>5.1 Properties of Fluid.</p> <p>5.2 Fluid statics -concept, definitions of total pressure and center of pressure, Buoyant force and criteria for stability of floating body. Pascal's law.</p> <p>5.3 Fluid dynamics- Types of flow, continuity equation, Bernoulli's Theorem, Euler's equation of motion.</p> <p>5.4 Flow through simple pipes – pressure drop in pipes.</p> <p>5.5 List of various instruments used for measuring various fluid properties.</p>	<p>5a. Describe different properties Of the fluid.</p> <p>5b. Use fluid laws to measure Various fluid properties.</p>	14	10

UNIT – 6 FLUID CONTROL SYSTEM AND PUMPS	6.1 Concept and need of control system. 6.2 Types of pumps 6.3 Working of reciprocating pumps 6.4 Working of Centrifugal pumps 6.5 Comparison of RC of CF pumps. 6.6 Simple problems on pumps.	6a. Describe Fluid control System. 6b. Explain the working and application of different Types of pumps. 6c. Determine the efficiency of various pumps using Appropriate formula.	12	9
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List of Tutorial		
No.	Unit	Name of Tutorial
1	1	Prepare power point presentation about Thermodynamic system.
2	2	Laws of Thermodynamics with Example.
3	3	Ideal Gases & Processes. (Make a Chart of that)
4	4	Thermodynamic cycles with its application.
5	5	Fundamentals of Hydraulics. (Power point presentation).
6	6	Fluid control systems & Pumps. (Prepare Animation of fluid control system with its parts)

List of Instruments/Equipment/TrainerBoard	
1	Thermal Power Plant.
2	Hydraulics Lab.
3	Reynolds's Apparatus.

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Fluid Mechanics and Hydraulics	Khurmi R. S.	S Chand publication
2	Thermodynamics	VARIA R. B.	ATUL PRAKASHAN
3	Oil Hydraulic Systems	Majumdar S.R.	Tata Mcgraw-Hill Publication, 3/e, 2013
4	Hydraulic and Pneumatic Controls	Srinivasan, R.	Vijay Nicole Imprints Private Limited, 2/e, 2008
5	Thermodynamic for Engineers	Mathur.M.L., Gupta.S.C.	Metropolitan Book Company-1985
6	Heat Engines	Shah.C.S., Pandya.N.C.	Charotar Publishing House Pvt. Ltd
7	Heat Engines	Ballaney.P.L.	Khanna Publications
8	Hydraulics & Hydraulic machinery	Patel.R.C. & Pandya.A.D.	Acharya Book Depot (1967)

Link of Learning Web Resource	
1	https://www.youtube.com/watch?v=xdRtWK1_2Eo
2	https://www.youtube.com/watch?v=OmhXb-miAhw
3	https://www.youtube.com/watch?v=YvQp2qy5l60
4	https://en.wikipedia.org/wiki/Thermodynamics
5	http://www.howstuffworks.com/search.php?terms=hydraulics

6	http://www.youtube.com/watch?v=FVR7AC8ExIM
7	http://www.youtube.com/watch?v=iOXRoYHdCV0
8	http://hyperphysics.phy-astr.gsu.edu/hbase/fluid.html#flucon

Mock Test	
1	https://www.prep.youth4work.com/Practice-Tests/Mechanical-Engineering-Test/Thermodynamics-Test
2	https://www.prep.youth4work.com/Practice-Tests/Mechanical-Engineering-Test/Hydraulics-and-Fluid-Mechanics-Test

CO'S AND PO'S MAPPING

PO'S/CO'S		CO1	CO2	CO3	CO4	CO5
PO1	An ability to apply knowledge of mathematics and engineering science.	MED	SUB	SLI	SLI	SLI
PO2	An ability to demonstrate, develop and conduct experiments, as well as to analyze and interpret data.	SLI	SUB	SUB	SUB	SUB
PO3	An ability to design a system component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	MED	SUB	SUB	SUB	SUB
PO4	An ability to perform with multidisciplinary teams.	MED	MED	SUB	SUB	SUB
PO5	Use of appropriate modern tool and application software that pertain to Automobile engineering technology systems.	NONE	NONE	NONE	NONE	NONE
PO6	An ability to identify, formulates, execute and solve engineering problems.	SLI.	MED.	MED.	SUB.	SUB.
PO7	An ability to communicate and present effectively in both verbal and written forms.	NONE	MED.	MED.	SUB.	SUB.
PO8	The broad education necessary to understand the impact of engineering solutions in global, economic, environmental and societal context.	MED.	NONE	MED.	SUB.	SUB.
PO9	Recognition of need for self-improvement, and an ability to engage in life-long learning.	NONE	NONE	NONE	NONE	NONE
PO10	Ability to aware about the contemporary issues.	SLI	SLI	SLI	SLI	SLI
PO11	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	MED.	MED.	MED.	SUB.	SUB.
PO12	Demonstrate to analyse and apply unconventional processes, automation, robotics Nanotechnology, Computer-Aided-Design & Manufacturing and knowledge in Automobile Engineering, Thermodynamics, Refrigeration & Air Conditioning and Jet Propulsion & Rocket Engineering to analyse and solve complex problems and to work professionally in such systems and plants.	SLI	MED.	MED.	MED.	MED.