

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Diploma Engineering				Branch	Automobile Engineering			
Semester	VI				Version	1.0.0.0			
Effective from Academic Year		2020-21			Effective for the batch Admitted in			July 2018	
Subject code	1AU2605	Subject Name			VEHICLE AIR CONDITIONING				
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:
No Pre-Requisites are required for understanding the subject.

Course Learning Outcomes:
Students will be able to:- CO1. Identify various components of Vehicle Air conditioning and heating system.. CO2. Apply various concepts related to Air conditioning and heating system. CO 3. Operate manually and automatic Air conditioning and heating system. CO 4. Diagnose various faults in air conditioning system by using suitable tools and instruments. CO 5. Follow safety rules while servicing of Air conditioning and heating system.

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 VEHICLE AIR-CONDITI ONING FUNDAM ENTALS.	1.1 Fundamental principles and various Definitions (i) Heat and Modes of heat transfer. (ii) Latent Heat, Sensible Heat. (iii) Various Refrigerants and its properties. (iv) Air circulation and Humidity. (v) Cooling the air. (vi) Drying and cleaning the air. (vii) Due Point Temperature, Wet bulb/Dry bulb Temperature, Humidity, Relative Humidity.	1a. Explain concepts of air conditioning. 1b. Describe Air Conditioning Cycle. 1c. Describe functions of various components of air-conditioning, & heating system.	18	13
	1.2 Air-conditioning principle with Schematic layout (Vapour Compression Refrigeration cycle)			
	1.3 Basic Air-conditioning systems and operation of basic components (i) Magnetic clutch. (ii) Types of compressors. (iii) Condensers.			

	<ul style="list-style-type: none"> (iv) Receiver Drier and Filter. (v) Different types of expansion valves and suction valves. (vi) Evaporator and heat sensing tube. (vii) Thermostats switch, Evaporator Pressure Regulator. (viii) Automotive air-conditioning controls. <p>1.4 Working of different automotive heaters.</p>			
UNIT – 2 VEHICLE AIR-CONDITI ONING AND HEATER SYSTEMS.	<p>2.1 Manually controlled air-conditioner heater systems.</p> <ul style="list-style-type: none"> (i) Different types of air-conditioner heater systems. (ii) Working and its operating modes. <p>2.2 Automatically controlled Air-conditioning systems.</p> <ul style="list-style-type: none"> (i) Automatic temperature control. (ii) Operating modes. (iii) Different parts of automatic controlled air conditioning system. (iv) Humidity Control (Humidifier and Dehumidifier) <p>2.3 Field installed air-conditioners.</p> <p>2.4 Automatic climate control.</p>	<p>2a. Describe various automotive Air-conditioner & Heater systems</p>	12	10
UNIT – 3 HEATER AND AIR-CONDITI ONER TROUBLE SHOOTIN G	<p>3.1 Safety in the shop.</p> <ul style="list-style-type: none"> (i) Fire prevention (ii) Shop safety rules (iii) Air-conditioner service safety rules <p>3.2 Servicing heating system</p> <ul style="list-style-type: none"> (i) Car heater system, trouble diagnosis chart <p>3.3 Causes of Air-conditioner failure</p> <p>3.4 Trouble shooting the Air-conditioner system.</p> <ul style="list-style-type: none"> (i) Checking out a trouble (ii) Air-conditioner trouble - diagnosis chart <p>3.5 Checking the refrigeration system.</p> <ul style="list-style-type: none"> (i) Checking system with sight glass (ii) Using the Leak detector (iii) Checking pressures with the gauge set 	<p>3a. Explain Diagnosis & Testing of Automotive air-conditioner system.</p> <p>3b. Describe fire prevention & shop safety.</p>	15	10
UNIT – 4 SERVICIN G OF VEHICLE AIR	<p>4.1 Air-conditioner maintenance and service.</p> <ul style="list-style-type: none"> (i) Periodic maintenance (ii) Vacuum pump service (iii) Discharging the system 	<p>4a. Explain Maintenance & service of various components of air-conditioner</p>	15	12

CONDITIO NING SYSTEMS.	(iv) Adding oil (v) Evacuating the system (vi) Vapour charging and Liquid charging Methods. (vii) Use of Recovery recharging unit.	4b. Explain Charging & Discharging of air- conditioner system..		
	4.2 Different types of air-conditioner service. 4.3 Removing and replacing components. (i) O - rings (ii) Hose clamps (iii) Compressor drive belts (iv) Removing and replacing the compressor (v) Removing and replacing other components 4.4 Servicing Air-conditioner compressors. (i) Servicing different types compressors (R-4, R-6, V-type etc.).			
		Total	60	45

List of Practical		
1	Test the Air Conditioning System for refrigerant leaks	4
2	Perform Evacuation of the Air-conditioner system	4
3	Perform Recharging the Air-conditioner system	4
4	Perform Air Conditioning system Recharging with Recovery unit	4
5	Trouble shooting the Air-conditioner system	4
6	Service Air-conditioner	4
7	Service Air-conditioner compressors	4
8	Service Heating systems	4

Link of Text Books			
No	Title of Books	Authors	Publication
1	Automobile Engineering (Volume – VI)	Anil Chhikara	Satya Prakashan

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Automotive Air-conditioning	William H Carouse & Donald L Anglin	Tata McGraw-Hill Co, Ltd, New Delhi
2	Automotive Air-conditioning -	Clifford L Samuels	Prentice Hall Int
3	Automotive Air-conditioning & Climate control system	Steven Daly)	Butterworth-Heinemann
4	Automotive heating and air conditioning	Mark Schnubel	Cengage Publication

Link of Learning Web Resource		
Sr No	Topic	Sample Video URL Address
1	How To Find and Repair AC Leaks EricTheCarGuy	https://www.youtube.com/watch?v=e31HCvckZAU
		http://youtube/e31HCvckZAU
2	How To Recharge an AC System EricTheCarGuy	https://www.youtube.com/watch?v=IN55uStu8Xs
		http://youtube/IN55uStu8Xs
3	Using AC Pressure Gauges To Fix Car AC Problems	https://www.youtube.com/watch?v=PdQGS6mJjQ8
		http://youtube/PdQGS6mJjQ8
4	Quick automotive a c system leak detection using uv dye	https://www.youtube.com/watch?v=1-R8kORf76M
		http://youtube/1-R8kORf76M
5	How to Troubleshoot your Car's AC System NBC Consumer Watch Advance Auto Parts	https://www.youtube.com/watch?v=QsxzcoYFWTk
		http://youtube/QsxzcoYFWTk
6	How to Recharge an Auto A C System Removing Connecting Refrigerant Cans to a Car	https://www.youtube.com/watch?v=orflU-cvxco
		http://youtube/orflU-cvxco
7	How to test for refrigerant leaks	https://www.youtube.com/watch?v=2XjAZjqSC-k
		http://youtube/2XjAZjqSC-k
8	How to pull vacuum on an R134a car AC system	https://www.youtube.com/watch?v=FiHr5V04dnc
		http://youtube/FiHr5V04dnc
9	How to evacuate and pull vacuum on an R134a car AC system	https://www.youtube.com/watch?v=8Yom2jLiKGA
		http://youtube/8Yom2jLiKGA
10	Evacuate vacuum down your Auto AC system w inexpensive Tools	https://www.youtube.com/watch?v=8kTyLkcu0dA
		http://youtube/8kTyLkcu0dA
11	Air Conditioning Troubleshooting	https://www.youtube.com/watch?v=WncHNLdU4EA
		http://youtube/WncHNLdU4EA
12	A C Troubleshooting part 1 of 2	https://www.youtube.com/watch?v=I5oqzuFNHx4
		http://youtube/I5oqzuFNHx4
13	A C Troubleshooting part 2 of 2	https://www.youtube.com/watch?v=tcQ3HVVHxm4
		http://youtube/tcQ3HVVHxm4