

॥ शीलं परं भूषणम् ॥

Shri Acharyaratna Deshbhooshan Shikshan Prasarak Mandal, Kolhapur

Mahavir Mahavidyalaya, Kolhapur

(Autonomous)

Affiliated to Shivaji University, Kolhapur



Syllabus for Choice Based Credit System (CBCS)

Bachelor of Vocation (B. Voc.) Programme

Programme	Bachelor of Vocation in AUTOMOBILE
Part	III
Semester	V
Course Code	
Course Name	AUTOMOBILE
Course Title	--
Paper No.	--

Under the Faculty of Interdisciplinary Studies (To be introduced from Academic Year 2022 – 23 onwards) Subject to the revisions& modifications made from time to time

Mahavir Mahavidyalaya, Kolhapur(Autonomous)
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(New syllabus under Autonomy to be introduced from June, 2023 onwards)

A) Primary Information:			
Programme	Bachelor of Vocation(B. Voc.) AUTOMOBILE		
Part	III	Semester	V
Course	Alternative fuels and Emission control Techniques	Course Code	BV C51
Paper No.	--	Course Type	Semester
Total Marks	50 Marks	Implementation	2022 - 23
Total Credits	03	Contact Hours	04 / Week
Course Title	--		

B) Course Objectives:	
i)	Understand the various production processes of fuels and lubricants
ii)	Understand the requirement and classification of lubricants
iii)	Know about the properties and various testing methods of fuels.
iv)	Know about the fuel characteristics.

C) Course Syllabi: (CR = Credits / IH: Instructional Hours)		
Units	CR	IH
Unit I : Introduction to Conventional & Alternative fuels	0.75	12
1.1 Introduction conventional fuels and alternative fuels, need of alternative fuels and their types and applications.		
1.2 Comparison between conventional fuels and alternative fuels. Properties of fuels- diesel and gasoline,		
1.3 Define additives and their effects on S.I. and C. I. engine.		
Unit II : Alternative fuels – Gaseous, Bio fuels & Synthetic fuels	0.75	12
2.1 Introduction to CNG, LPG, ethanol, bio gas, bio diesel syngas & hydrogen.		
2.2 Alternative fuels, availability, properties, and engine/ Vehicle modification requirement.		
2.3 Types of Alternative fuels, Advantages – disadvantages of Alternative fuels,		
2.4. Safety aspects of Alternative fuels.		

Unit III : Emission control(SI & CI)	0.75	12
3.1 Emission formation in SI & CI Engines		
3.2 Effects of design on emission formation in SI & CI Engine		
3.3 Emission controlling treatments in SI & CI Engines		
3.4 Emission controlling components in SI & CI Engines		
Unit IV :Automobile Emission effects	0.75	12
3.1 Emission Norms-As per BS VI Standard & Euro Standard.		
3.2 Emission effects on health and environment.		
3.3 Emission inventory		
3.4 Ambient air quality monitoring		

D) Reference Materials

D1) Text Books for Reading

1.	V. Ganesan, Internal 1. combustion engines,4/e, McGraw Hill, 2015
2.	J. Erjavec, A systems approach to automotive technology, 2/e, Cengage Learning, 2013.
3.	Automobile Vol.-2 Anil Chikara, Standard Publishers

D2) Books for Reference

1.	Automobile Mechanics Crouse / Anglin. Tata McGraw Hill.
2.	Automobile R.B. Gupta, Satya Prakashan
3.	Automotive Technology H. M. Sethi, Tata McGraw Hill

E) Suggested methods of Teaching:

i)	Online teaching/ Offline / Internship
ii)	Power point presentation/ Seminars
iii)	Group discussion/ Hands on training
iv)	Demonstration/ Industrial training

F) Course Outcomes:

Blooms Taxonomy

CO1	The student can identify different areas of Fuels, Alternative Fuels and Lubricants.	
CO2	Can find the applications of all the areas in day to day life.	
CO3	Understand composition of various fuel additives	
CO4	Understand various Emission Control devices	

G) Scheme of Course Evaluation

1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	Total Marks	50

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.		
3.		
4.		
5.	Total Marks	10

I) Question Paper Pattern (40 Marks)		
Q. No.	Nature / Type of Question	Marks
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	Total Marks	40

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A) Primary Information:			
Programme	Bachelor of Vocation (B. Voc.) AUTOMOBILE		
Part	III	Semester	V
Course	Automotive refrigeration & air condition	Course Code	BV C52
Paper No.	--	Course Type	Semester
Total Marks	50 Marks	Implementation	2022 - 2023
Total Credits	03	Contact Hours	04 / Week
Course Title	--		

B) Course Objectives:	
i)	To present a problem oriented in depth knowledge of Automotive air conditioning.
ii)	To broad knowledge about refrigeration components .
iii)	To address the underlying concepts and methods behind Automotive air conditioning.
iv)	To know about service & repair of HVAC system

C) Course Syllabi: (CR = Credits / IH: Instructional Hours)		
Units	CR	IH
Unit I: Fundamentals of Refrigeration & Air Conditioning Components	0.75	12
1.1 Introduction, types of cycles (carnot cycle, reverse carnot cycle, simple vapour compression, types & properties of refrigerant		
1.2 Introduction to Air conditioning components: compressors, condensers , flow control devices, evaporators , accumulators		
1.3 Advantages and disadvantages of HVAC System		
1.4 Applications of HVAC System		
Unit II :Air distribution system	0.75	12
2.1 Introduction to comfort condition & Air management & heater Systems		
2.2 Types of air distribution modes (face, foot defrost, & demist)		
2.3 Introduce to A/C duct, air filters, blower fan.		

2.4 Temperature control systems(manual/automatic)		
Unit III :Air Routing & Temperature Control	0.75	12
3.1 Objectives of air routing & temperature control.		
3.2 Evaporator air flow through the re-circulating unit.		
3.3 Automatic temperature control, duct system, controlling flow, vacuum reserve.		
3.4 Testing the air control of air handling system		
Unit IV : Diagnostics, Trouble shooting, Service & Repair	0.75	12
4.1 Initial vehicle inspection, temperature measurements, pressure gauge reading and cycle testing.		
4.2 leak detection and detectors. Refrigerant safety/handling, refrigerant recovery.		
4.3 oil system, flushing system, odour removal, retrofitting.		
4.4 Removing and replacing components, Compressor service		

D) Reference Materials	
D1) Text Books for Reading	
1.	Mark Schnubel, "Automotive Heating & Air Conditioning", Thomson Delmar Learning, 3rd edition, NY
2.	William H. Crouse & Donald L. Anglin, "Automotive Air Conditioning. Mc Graw Hill, Inc., 1990.
3.	A Text book of Refrigeration and Air conditioning" by Kurmi R S and J K Gupta
4.	ASHRAE Handbook-1985 Fundamentals
D2) Books for Reference	
1.	Sam Sugarman, "HVAC Fundamentals. Fairmont Press, ISBN0-88173-489-6
2.	MacDonald K. L " Automotive Air Conditioning ", Theodore Audel series, 1978
3.	Paul Weisler, "Automotive Air Conditioning, Reston Publishing Co. Inc. 1990. .

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline / Internship
ii)	Power point presentation/ Seminars
iii)	Group discussion/ Hands on training
iv)	Demonstration/ Industrial training

F) Course Outcomes:		Blooms Taxonomy
CO1	Apply the knowledge of refrigeration & air condition.	
CO2	Research related skills developed in students.	
CO3	The student can identify different areas of Automobile air conditioning.	
CO4	Student Can find the applications of all the areas in day to day life.	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	Total Marks	50

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.		
3.		
4.		
5.	Total Marks	10

I) Question Paper Pattern (40 Marks)		
Q. No.	Nature / Type of Question	Marks
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	Total Marks	40

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A) Primary Information:			
Program	Bachelor of Vocation(B. Voc) AUTOMOBILE		
Part	III	Semester	V
Course	AUTOMOTIVE ELECTRONICS	Course Code	BV C53
Paper No.	--	Course Type	Semester
Total Marks	50 Marks	Implementation	2022 - 2023
Total Credits	03	Contact Hours	04 / Week
Course Title	--		

B) Course Objectives:	
i)	To learn and apply the basic terminology associated with different fields of sensors and applications.
ii)	Introduce machine tools in their proper perspective and present the necessary to grasp the subject
iii)	To address the underlying concepts, methods and application of different sensors and applications.
iv)	Understanding & learn safety of measures of electronic system.

C) Course Syllabi: (CR = Credits / IH: Instructional Hours)		
Units	CR	IH
Unit I : Introduction To Automotive Electronics	0.75	12
1.1 Modern & Current trends in automobiles.		
1.2 Open and close loop systems Components for electronic engine management		
1.4 Electronic management of chassis system, Vehicle motion control.		
Unit II : Charging & Ignition system	0.75	12
2.1 Generation of direct current. Shunt generator characteristics. Armature reaction, Voltage & current regulators.		
2.2 Compensated voltage regulator alternators principle & constructional aspects and bridge benefits		
2.3 Types of ignition system, Construction & working of battery coil and magneto ignition systems, Relative merits, types and construction of spark plugs.		
2.4. Electronic ignition systems, Advantages of electronic ignition systems	0.75	12
2.5 Contact less electronic ignition system, and electronic spark timing control		

Unit III : Sensors , Actuators, Engine control systems			
3.1 Basic sensor arrangement, Types of sensors such as-Oxygen sensors, Crank angle position sensors-Fuel metering/vehicle speed sensor and detonation sensor-Altitude sensor, flow sensor. Throttle position sensors. Solenoids, stepper motors, and relays			
3.2 Open loop and closed loop control systems, difference between the open& closed loop system.			
3.3 Engine cranking and warm up control, Acceleration enrichment-Deceleration leaning and idle speed control. Exhaust emission control engineering			
Unit IV : Safety System			
4.1 Body electronics including lighting control, remote keyless entry, immobilizers.		0.75	12
4.2 Electronic instrument clusters and dashboard electronics.			
4.3 aspects of hardware design for automotive including electro-magnetic interference suppression, electromagnetic compatibility etc., (ABS) antilock braking system, (ESP) electronic stability.			

D) Reference Materials	
D1) Text Books for Reading	
1.	"Understanding Automotive Electronics: An Engineering Perspective" by William Ribbens.
D2) Books for Reference	
1.	Kholi P.L., Automotive Electrical Equipment, Tata McGraw-Hill Co. Ltd. New Delhi, 19752. Young..
2.	Crouse. W.H. Automobile Electrical Equipment, McGraw Hill Book Co Inc., New York, 1980. Spreadbury F.G. Electrical ignition Equipment, Constable & Co. Ltd., London 1962
3.	A.P., & Griffiths. L., Automobile Electrical Equipment, English Language Book Society & New Press, 1990

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline / Internship
ii)	Power point presentation/ Seminars
iii)	Group discussion/ Hands on training
iv)	Demonstration/ Industrial training

F) Course Outcomes:		Blooms Taxonomy
CO1	Understand wiring harness in automotive ignition system.	
CO2	Understand various Sensors electronic equipment.	
CO3	Awareness about Automotive Electronics	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	Total Marks	50

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.		
3.		
4.		
5.	Total Marks	10

I) Question Paper Pattern (40 Marks)		
Q. No.	Nature / Type of Question	Marks
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	Total Marks	40

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A) Primary Information:			
Program	Bachelor of Vocation(B. Voc) AUTOMOBILE		
Part	III	Semester	V
Course	Vehicle Hydraulics & Pneumatics	Course Code	BV C54
Paper No.	--	Course Type	Semester
Total Marks	50 Marks	Implementation	2022 - 2023
Total Credits	03	Contact Hours	04 / Week
Course Title	--		

B) Course Objectives:	
i)	Study of working principle of various components used in hydraulic and pneumatic systems.
ii)	Drawing and design of hydraulic and pneumatic systems.
iii)	To address the concepts and methods behind Hydraulics and Pneumatics systems.
iv)	Study of low-cost automation.

C) Course Syllabi: (CR = Credits / IH: Instructional Hours)		
Units	CR	IH
Unit I: Introduction to Hydraulic Devices	0.75	12
1.1 Centrifugal Pumps - Types, Construction and working of centrifugal pump, need of priming, Net positive suction head (NPSH), Fault findings and remedies, Pump selection.		
1.2 Reciprocating Pumps - Construction and Working of single and Double Acting Reciprocating pump,		
1.4 Comparison between Reciprocating and Centrifugal Pump		
Unit II: Hydraulic Devices	0.75	12
2.1 Working principles, construction and applications of Hydraulic jack, Hydraulic ram, Hydraulic lift, Hydraulic press.		
2.2 Introduction to the Pumping devices Like Gear pumps used in hydraulic circuits, Vane type, Swash plate type pump.		
2.3. Comparison of above pumps for various characteristics and their applications.		

Unit III: Components of Hydraulics & Pneumatic		0.75	12
3.1 Introduction to Hydraulic and Pneumatic actuators. construction and working of Hydraulic cylinders (single, double acting & telescoping)			
3.2 Introduction to Pneumatic Actuators. Pneumatic cylinders (single and double acting).			
3.3 Classifications of Hydraulic and Pneumatic valves (poppet, ball, needle, throttle, pressure control directional control).			
3.4 construction and working of Nonreturn valves. Proportionating valve.			
Unit IV: Accessories & Circuits		0.75	12
4.1 Introduction to Hydraulic filters and strainers, difference between filters and strainers.			
4.2 function and working, FRL unit. Types of Hoses and Connectors. Types of seals and Gaskets for hydraulic and pneumatic systems.			
4.3. Introduction to Hydraulic and Pneumatic circuits. Hydraulic and Pneumatic Symbols. Types of Hydraulic and Pneumatic circuit. Construction & working of Hydraulic brakes & press, air brakes. Comparison of hydraulic & Pneumatic.			

D) Reference Materials	
D1) Text Books for Reading	
1.	A textbook of Fluid mechanics & Hydraulic machines Auther Dr. R. K Bansal.
2.	S. Ilango and V. Soundararajan - Introduction to Hydraulics And Pneumatics, PHI Learning Private Limited, New Delhi.
D2) Books for Reference	
1.	K. Shanmuga Sundaram - Hydraulic and Pneumatic, Controls S. Chand.
2.	Dr. P. N. Modi, Dr. S.M. Seth - Hydraulic and Fluid Mechanics Standard Book House, Delhi Pippengen and Hicks Industrial Hydraulics Tata McGraw Hill Int
3.	R.J. Garde and A.G. Mirajgaoker Engineering Fluid Mechanics SITECH Publications (India) PVT. LTD

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline / Internship
ii)	Power point presentation/ Seminars
iii)	Group discussion/ Hands on training
iv)	Demonstration/ Industrial training

F) Course Outcomes:		Blooms Taxonomy
CO1	The student can identify different areas and applications of Hydraulics and Pneumatics systems.	
CO2	Ability to select appropriate components required for hydraulic and pneumatic systems.	
CO3	Student will able to understand Industrial applications of hydraulic and pneumatic systems & troubleshooting of hydraulic & pneumatic systems.	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	Total Marks	50

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.		
3.		
4.		
5.	Total Marks	10

I) Question Paper Pattern (40 Marks)		
Q. No.	Nature / Type of Question	Marks
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	Total Marks	40

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A) Primary Information:			
Program	Bachelor of Vocation(B. Voc.) AUTOMOBILE.		
Part	III	Semester	V
Course	Alternative fuel & engine testing lab	Course Code	Practical BV C11
Paper No.	--	Course Type	Semester
Total Marks	50 Marks	Implementation	2022 - 23
Total Credits	05	Contact Hours	06 / Week
Course Title	--		

B) Course Objectives:	
i)	To present a problem oriented in depth knowledge of Alternate fuel and engine.
ii)	To address the concepts and methods behind alternate fuel and energy system.
iii)	To know about emission control.
iv)	To detail study about various testing methods of engine.

C) Course Syllabi: (CR = Credits / IH: Instructional Hours)		
Practicals :	CR	IH
1. Performance study of petrol and diesel engines both at full load and part load conditions	05	75
2. Morse test on petrol and diesel engines.		
3. Determination of compression ratio, volumetric efficiency and optimum cooling water flow rate in engines.		
4. Heat balance test on an automotive engine. Testing of 2 and 4 wheelers using chassis dynamometers		
5. Measurement of HC, CO, CO ₂ , O ₂ using exhaust gas analyser.		
6. Diesel smoke measurement.		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline / Internship / Visit to PUC center
ii)	Power point presentation/ Seminars
iii)	Group discussion/ Hands on training
iv)	Demonstration/ Industrial training

E) Course Outcomes:		Blooms Taxonomy
CO1	To avail the technology for providing the knowledge and skills	
CO2	To promote interdisciplinary research and industry driven innovation in renewable fuels for IC engine applications.	
CO3	To provide a collaborative research mechanism for creating innovative technologies.	
CO4	Can find the applications of all the areas in day to day life.	

F) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	25
2.	Continuous Internal Evaluation (CIE)	25
3.	Total Marks	50

G) Question Paper Pattern (40 Marks)		
Q. No.	Nature / Type of Question	Marks
1.	Practical (Lab-work)	25
2.	Submission Practical record book & project Report / Visit report.	15
3.	Viva-voce	10
4.	Total	50

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A) Primary Information:			
Program	Bachelor of Vocation(B. Voc.) AUTOMOBILE.		
Part	III	Semester	V
Course	Refrigeration and air conditioning Lab	Course Code	Practical BVC12
Paper No.	--	Course Type	Semester
Total Marks	50 Marks	Implementation	2022 - 23
Total Credits	05	Contact Hours	06 / Week
Course Title	--		

B) Course Objectives:	
i)	Determine the performance of refrigeration and air-conditioning system through various performance parameter.
ii)	Carry out fault finding in refrigeration & air conditioning system.
iii)	Undergo the repair and maintenance of such system.
iv)	Conduct the trials on Refrigeration & air conditioning equipment.

C) Course Syllabi: (CR = Credits / IH: Instructional Hours)		
Practicals	CR	IH
1. Test on air conditioning test rig.	05	75
2. Study and demonstration on car and bus air conditioning system.		
3. Study and demonstration of controls in refrigeration		
4. Study of different components refrigeration like - Compressor, Condenser, Evaporators, Expansion device, Blower fans, Hating systems.		
5. Study of installation/operations/maintenance practices for refrigeration systems.		
6. Visit to maintenance shop of automotive air conditioning and writing report on it.		

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline / Internship
ii)	Power point presentation/ Seminars
iii)	Group discussion/ Hands on training
iv)	Demonstration/ Industrial training

F) Course Outcomes:		Blooms Taxonomy
CO1	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems.	
CO2	Illustrate the fundamental principles and applications of refrigeration and air conditioning system.	
CO3	Operate and analyze the refrigeration and air conditioning systems.	

I) Question Paper Pattern (40 Marks)		
Q. No.	Nature / Type of Question	Marks
1.	Practical (Lab-work)	25
2.	Submission practical record book & project report	15
3.	Viva-voce	10
4.	Total	50

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A) Primary Information:			
Program	Bachelor of Vocation (B. Voc.) AUTOMOBILE.		
Part	III	Semester	V
Course	Automotive Electronics Lab	Course Code	Practical BVC11
Paper No.	--	Course Type	Semester
Total Marks	50 Marks	Implementation	2022 - 23
Total Credits	04	Contact Hours	06 / Week
Course Title	--		

B) Course Objectives:	
i)	To develop the ability to test and validate automotive electronic systems.
ii)	Students will apply knowledge of automotive engineering & practices to pursue successful career in the field of automotive technology.
iii)	To study and analyse automotive sensors and actuators.
iv)	To detail study about various amplifier.

C) Course Syllabus: (CR = Credits / IH: Instructional Hours)		
Practical:	CR	IH
1. Study Gates, Adder and Flip-Flops	04	75
2. Study of rectifier and filters, Characteristics of amplifiers.		
3. Study of interfacing stepper motor & CRT terminal.		
4. Study of battery charging system and setting of regulators and out.		
5. Study of battery ignition system.		

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline / Internship
ii)	Power point presentation/ Seminars
iii)	Group discussion/ Hands on training
iv)	Demonstration/ Industrial training

E) Course Outcomes:		Blooms Taxonomy
CO1	Diagnose the automotive system failures and repair / replace the components / systems so as to bring the vehicle in original condition.	
CO2	Use relevant machinery, materials, equipment and processes to manufacture automobile components	
CO3	Student will get knowledge about battery charging system.	

F) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	Total Marks	50

G) Question Paper Pattern (40 Marks)		
Q. No.	Nature / Type of Question	Marks
1.	Practical (Lab-work)	25
2.	Submission Practical record book & project report	15
3.	Viva-voce	10
4.	Total	50

Mahavir Mahavidyalaya, Kolhapur (Autonomous)
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A) Primary Information:			
Programme	Bachelor of Vocation(B. Voc.) AUTOMOBILE		
Part	III	Semester	VI
Course	Hydraulic & Pneumatic lab	Course Code	Practical BVC13
Paper No.	--	Course Type	Semester
Total Marks	50 Marks	Implementation	2022 - 23
Total Credits	04	Contact Hours	06 / Week
Course Title	--		

B) Course Objectives:	
i)	Understand the working of hydraulic pumps
ii)	Understand various Valves & Switches of Hydraulic & Pneumatic Systems
iii)	Study of Hydraulic Circuit Trainer
iv)	Study of Pneumatic Circuit Trainer

C) Course Syllabi: (CR = Credits / IH: Instructional Hours)		
Practical:	CR	IH
1. Study of construction & types of hydraulic & pneumatic pump.	05	75
2. Study of Hydraulic and Pneumatic valves.		
3. Study of solenoid valves, limit switches. Pressure, flow control valve		
4. Demonstration of Hydraulic Circuit Trainer		
5. Demonstration of Pneumatic Circuit Trainer		
6. Troubleshooting in Hydraulics & Pneumatics		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline / Internship
ii)	Power point presentation/ Seminars
iii)	Group discussion/ Hands on training
iv)	Demonstration/ Industrial training

E) Course Outcomes:		Blooms Taxonomy
CO1	Plan to perform experiments and practices to use the results to solve problems.	
CO2	Apply relevant technologies and tools with an understanding of the limitations.	
CO3	Identify various components of hydraulic & pneumatic systems.	
CO4	Maintain and select appropriate machine, equipment and instrument in field of Hydraulic .	

F) Question Paper Pattern (40 Marks)		
Q. No.	Nature / Type of Question	Marks
1.	Practical (Lab-work)	25
2.	Submission practical record book & project report	15
3.	Viva-voce	10
4.	Total	50
