B.Tech (Automobile Engineering) Laboratory Mapping with Virtual Laboratory as available in the Web Page (http://www.vlab.co.in/broad-area-mechanical-engineering) for the New Syllabus effective from 2018

Semester	Paper Code	Name of Paper	Name of Lab/ Experiment	Mapped Virtual Lab	Name of Experiment	Offering Institute	Remarks
I	**ES-ME192**	Workshop/ Manufacturing Practices	Workshop Practice: 1. Machine shop (10 hours) 2. Fitting shop (8 hours) 3. Carpentry (6 hours) 4. Electrical & Electronics (8 hours) 5. Welding shop (8 hours (Arc welding 4 hrs + gas welding 4 hrs) 6. Casting (8 hours) 7. Smithy (6 hours) 8. Plastic moulding & Glass Cutting (6 hours)	NIL	NIL	NIL	Till now not recommended
II	**ES-ME291**	Engineering Graphics & Design	1. Introduction to engineering design and its place in society 2. Exposure to the visual aspects of engineering design 3. Exposure to engineering graphics standards 4. Exposure to solid modelling 5. Exposure to computer-aided geometric design 6. Exposure to creating working drawings 7. Exposure to engineering communication	NIL	NIL	NIL	Till now not recommended
III	**PC-AUE 391**	Machine Drawing	Schematic product symbols for standard components in mechanical, electrical and electronic systems, welding symbols and pipe joints; Orthographic projections of machine elements, different sectional views- full, auxiliary sections; Isometric projection of components; Assembly and detailed drawings of a mechanical assembly, such as a plummer block, tool head of a shaping machine, tailstock of a lathe, simple gear box, flange coupling, welded bracket joined by stud bolt on to a structure, welded pipe joints indicating work parts before welding, etc.	Engineering Graphics Lab	Orthographic projections	IIT Bombay	

			Practicing AutoCAD or similar graphics softwares and making orthographic and isometric projections of different components.				
IV	**PC-AUE 491**	Manufacturing & Testing Lab	1. Impact tests: Charpy or Izod tests; Hardness test, Test for drawability of sheet metals through cupping test; 2. Fatigue test of a typical sample. 3. Sample preparation and etching of ferrous and non-ferrous metals and alloys for metallographic observation; 4. Experiments on heat treatment of carbon steels under different rates of cooling including quenching, and testing for the change in hardness, and observing its microstructural changes for standard specimen through metallographic studies. 5. Determining spring stiffness under tension and compressive loads; Strain gauge based strain/ deflection/ force measurement of a cantilever beam; 6. Tension Test and Compression Test of ductile and brittle materials: stress-strain diagram, determination of yield strength, ultimate strength, modulus of elasticity, percentage elongation and percentage reduction in areas, observation of fractured surfaces; Bend and rebend test of flat test pieces, determination of bending stresses; 7. Torsion Test; Experiments on friction: determination of coefficient of friction; 8. Sand preparation and testing: specimen preparation for testing permeability, clay content, grain fineness number, moisture content, green compression strength, green shear strength, splitting strength, hardness, etc.; 9. Casting of metals after preparation of a suitable type moulds; Experiments on	Strength of Materials Lab	1. Izod Impact Test 2. Charpy Impact Test 3. Tensile Test on Mild Steel 4. Tensile Test on Cast Iron 5. Compression Test on Mild Steel 6. Compression Test on Cast Iron 7. Torsion Test on Mild Steel	NIT Karnataka, Surathkal	

			properties of post casting, fettling, cleaning, deburring, and polishing operations; 10. Same experiment for another type of moulds. 11. Practicing smithy or forging of carbon steels and testing for its property changes; 12. Laboratory experiments in Fabrication processes to observe effects of varying process parameters in GMAW 13. Testing for Joint defects in GMAW with visual inspection and DP test. 14. Surface roughness measurement. 15. Measurement of threads, gears.				
V	**PC-AUE 591**	Fluid Mechanics & Heat Transfer Lab	1. Measurement of co-efficient of discharge of given orifice and venturi meters. 2. Determination of the co-efficient of friction factor for flow through pipes. 3. Determination of the performance characteristics of a centrifugal pump. 4. Determination of the performance characteristics of Pelton Wheel. 5. Determine the flow rate and velocity profile in a duct using pitot tube. 6. Determination of thermal conductivity of a metal rod and/or insulating powder materials. 7. Heat transfer through forced convection. 8. Heat transfer through natural convection from a vertical surface. 9. Determination of the convective heat transfer coefficient for flow over a heated plate 10. Measurement of emissivity in a test surface. 11. Experiment with a parallel flow and a counter flow heat exchanger. 12. Determination of the performance characteristics of a vapour compression system 13. Heat transfer through a pin fin.	Hydraulics and Fluid Mechanics Lab	1Venturi Meter Experiment 2.Orifices Experiment 3.Turbines Experiment	IIT Hyderabad	Sl.No.1 and 4 are having related virtual lab.
				Heat & Thermodynamics Virtual lab	1.Heat_Transfer by Natural Convection	Amrita Vishwa Vidyapeetyham University	Sl. No. 8 is having virtual lab

V	**PC-AUE 592**	Automobile Engineering Lab I (Engine & Chassis Component Lab)	1. Dismantling, measurement, inspection and assembling of different modern engine [like Multipoint fuel injection (MPFI) and Common rail injection (CRI) engines and Digital twin spark ignition (DTSI) etc.] engine for passenger car, commercial vehicle and two wheeler engines. 2. Study of fuel supply system (SI and CI) and structure and testing of common rail high pressure injectors. 3. Dismantling, assembling and testing of different types of Fuel injection Pumps such as distributor type, high pressure pump. 4. Electronic ignition and battery ignition system with accessories. 5. Study of cooling, lubrication. 6. Study and testing of automotive air conditioning system. 7. Dismantling and assembling of different types of clutch. 8. Dismantling and assembling of different types of Gear. 9. Dismantling and assembling of different Steering system and study of driver seat. 10. Study of Frames used for Heavy commercial vehicle (HCV), Car, Two & Three Wheelers and Dismantling and assembling of Suspension system. 11. Dismantling and assembling of Braking system, Brake adjustment and brake bleeding. 12. Dismantling and assembling of Wheels and Tyres. 13. Dismantling and assembling of Propeller Shaft, Universal Joints and Differential.	NIL	NIL	NIL	Till now not recommended
V	**PC-AUE 593**	Automobile Engineering Lab II (ETPM Lab)	1. Valve Timing Diagram for Four Stroke Engine 2. Valve Timing Diagram for Two Stroke Engine 3. Studying the components and working	NIL	NIL	NIL	Till now not recommended

			principle of an MPFI engine 4. Performance test and energy balance on MPFI engine at different load conditions. 5. Performance test and energy balance on 2-Stroke Petrol engine at different load conditions. 6. Performance test and energy balance on 2-Stroke Diesel Engine at different load conditions. 7. Performance test and energy balance on 4-Stroke Petrol engine at different load conditions. 8. Performance test and energy balance on 4-Stroke Diesel Engine at different load conditions. 9. Morse test on petrol engine. 10. Determination of flash and fire point of fuels and lubricating oil. 11. Determination of calorific value of different types of fuel by Bomb calorimeter. 12. Measurement of pollutants emitted from the vehicle by gas analyzer/ Orsat apparatus/ smoke meter.				
VI	**PC-AUE 691**	Automobile Engineering Lab III (Automotive Design Lab)	Module 1: Sketcher: Introduction to CATIA/CREO, History, Basics, GUI, Use of mouse buttons, Sketcher, constraints, profile, setting workbench, Standard toolbar, how to open sketcher, sketch details and important toolbar for sketch, Profile toolbar, Types of constraints, constraint application, constraint colour, Sketch constraint, view toolbar, Operation toolbar, Specification tree use, selecting toolbars, Sketch toolbar, Visualization toolbar 7. Toolbar setting, plane size setting, graphics properties	NIL	NIL	NIL	Till now not recommended

			toolbar. Module 2: Part Design: Introduction to Design tools like Extrude; Revolve; Shell; Pad etc needed to generate solid models using CATIA/CREO software. Learning different tools of modeling software with exercise – Piston, Piston Pin, Connecting Rod, Crankshaft, Cylinder, Camshaft, Flywheel. Module 3: Assembly Design: Assembly modeling of automotive mechanicals exercises – Piston - Connecting Rod – Crankshaft Assembly, Cam – Follower Assembly, Gear Assembly etc.				
V	**PC-AUE 692**	**Automobile Engineering Lab IV (Vehicle Maintenance Lab)**	1. Study of fuel filter (petrol & diesel) and air cleaner (dry & wet), 2. Study of fuel and brake bleeding. 3. Inspection of tyre and tube. 4. Study of BS-IV engine. 5. Tappet adjustment & valve timing diagram of four stroke engine 6. Study the air brake system & antilock braking system and their fault detection 7. Testing of a nozzle 8. Engine compression test 9. Maintenance of vehicle 10. Study of vehicle lifting machine 11. Study and experiment on wheel balancing machine 12. Study and experiment on wheel alignment machine 13. Study and experiment on head light focusing of vehicles 14. Under body inspection of vehicle either by lifting the vehicle or bringing the vehicle over underground inspection pit.	NIL	NIL	NIL	Till now not recommended
VII	**PC-AUE 791**	Automobile Engineering Lab V	Electrical 1. Battery testing	NIL	NIL	NIL	Till now not recommended

		(Automotive Electrical & Electronics Lab)	2. Alternator testing. 3. Starter motor testing. 4. Diagnosis of ignition system. 5. Diagnosis of automotive electrical wiring. 6. Fault finding of relay & fuses in car using Off Board Diagnostics Systems (OBDS). 7. Relay & fuse Fault diagnostic of a car using OBDS. Electronics 1. Characteristics of rectifier. 2. Study of IC timer. 3. Study of Microprocessor 8085. 4. Simple ALP program using 8085 MEL Kit. 5. Data acquisition from sensors using 8085 MEL Kit. 6. Interfacing of stepper motor with 8085 MEL Kit. 7. Fault finding location of sensor in car using OBDS.				