

DEPARTMENT OF MECHANICAL ENGINEERING

LABORATORIES FACILITY

(B) LIST OF EXPERIMENT LAB-WISE

Sl. No.	Name of the Lab. Course	List of Exercises / Experiment
1.	Applied Mechanics Lab. (IME-351 / EME-201)	<ol style="list-style-type: none">1. To verify the law of polygon of forces2. To verify the laws of friction and determination of the coefficient of friction3. To determine the value of gravity by simple pendulum4. To determine mechanical advantage, velocity ratio and efficiency of worm & worm wheel and to determine machine law5. To determine mechanical advantage, velocity ratio and efficiency of screw jack and to determine machine law6. To determine mechanical advantage, velocity ratio and efficiency of a double purchase crab and to determine machine law7. To determine mass moment of inertia of the flywheel8. To determine modulus of rigidity of a rod9. To determine reactions of a simply supported beam10. To determine modulus of elasticity of wires by Searl's apparatus11. To determine spring constant and modulus of rigidity of a spring
2.	Material Science Lab. (IME-352 / EME-203)	<ol style="list-style-type: none">1. To identify different kind of materials by observation2. To prepare a specimen for metallographic examination3. To perform Jominy End Quench test to determine hardenability of steel4. To determine Rockwell hardness of a test specimen5. To determine Brinell hardness of a test specimen6. To determine Vicker's hardness of a test specimen7. To perform tensile test on Universal Testing Machine8. To perform compression test on Universal Testing Machine9. To perform Izod and Charpy Impact tests10. To perform torsion test on torsion testing machine11. To perform fatigue test on fatigue testing machine12. To perform creep test13. To perform bend (flexural) test
3.	Machine Drawing Lab. (IME-353 / EME-207)	<ol style="list-style-type: none">1. To study Classification of drawings, of Graphic language, Principles of drawing, IS codes for Machine drawing, Lines, Scales, Sections, Dimensioning, Standard abbreviations2. To study & draw Orthographic Projections, Principles of first and third angle projections, drawing and sketching of machine elements in orthographic projections, spacing of views3. To study & draw Screwed (Threaded) fasteners, Screw thread nomenclature, forms of threads, Thread series, Thread designation, Representation of threads, Bolted joints, Locking arrangement for nuts, Foundation bolts4. To study & draw Keys and cotter joints.5. To study & draw Shaft couplings, Rigid and flexible coupling6. To study & draw Riveted Joints, Rivets and riveting, Rivet heads, Classification of riveted joints7. To draw Assembly drawing like Engine parts, Stuffing box etc.8. To draw Free hand sketching of some threaded fasteners and

		simple machine components
4.	Energy Conversion Lab. (IME-453 / EME-310)	<ol style="list-style-type: none"> 1. Study of fire tube boiler models 2. Study of water tube boiler models 3. Study of reaction turbine models 4. Study of impulse turbine models 5. Study of simple steam engine model 6. Study of compound steam engine models 7. Study of gas turbine models 8. Study of mini steam power plant
5.	Heat & Mass Transfer Lab. (IME-452 / EME-303)	<ol style="list-style-type: none"> 1. To determine the convective heat transfer coefficient for heated vertical cylinder losing heat to the ambient by free or natural convection and to find the theoretical value for comparison with the experimental value 2. To determine the convective heat transfer coefficient for a horizontal pipe having air flowing under forced convection and to find the theoretical heat transfer coefficient for comparison with the experimental value 3. To draw the variation of temperature along the length of fin under forced convection 4. To determine the value of heat transfer coefficient under forced condition and to find theoretical value of temperature along the length of fin 5. To determine the value of effectiveness and efficiency of the pin fin for insulated and boundary conditions 6. To find emissivity of grey body and study its variation with the temperature of the body 7. To determine the thermal conductivity of insulating powder. 8. To study the heat pipe in heat pipe demonstrator unit and to draw the temperature graph of heat pipe, copper and stainless steel pipe 9. Experiment on solar collector 10. Heat exchanger: parallel flow experiment 11. Experiment on cooling tower 12. Experiment on critical insulation thickness 13. Conduction: Determination of thermal conductivity of fluids 14. Conduction: Thermal contact resistance effect
6.	Manufacturing Science & Engineering-I Lab. (IME-451)	<ol style="list-style-type: none"> 1. To design a pattern containing hole for a casting 2. To make a wooden pattern 3. To make a mould with core for casting 4. To make a plastic component using injection moulding machine 5. To make a part using hand forging 6. To study forging-power hammer 7. To bend a tube using sand on tube bending machine 8. To study press work die using blanking and piercing to make a washer 9. To measure spring back in bending of sheet on UTM
7.	Manufacturing Science & Engineering-II Lab. (IME-551 / EME-301)	<ol style="list-style-type: none"> 1. To determine shear-angle (using formula) with tube cutting on lathe machine 2. To perform taper turning operation on lathe 3. To make thread on Lathe machine 4. To provide tool angles using Tool Grinding machine 5. To cut a spur gear teeth on a milling machine 6. To machine a block on shaper machine 7. To perform surface finishing on surface grinder 8. To drill holes on a job using drilling machine and to study twist-drill 9. Study of different tool angles and tool materials

		<ol style="list-style-type: none"> 10. To make a lap joint using gas welding 11. To make a lap / butt joint using arc welding 12. To perform spot welding to join two thin metallic sheets 13. To study Electro-Discharge Machining (EDM) process
8.	I C Engine Lab. (IME-552 / EME-310) in Energy Conversion Lab.	<ol style="list-style-type: none"> 1. To study the working of two stroke petrol engine 2. To study the working of four stroke petrol engine 3. To conduct Morse test on given multi cylinder petrol engine to determine the indicated power developed in each cylinder of the engine and its mechanical efficiency 4. To prepare heat balance for two stroke diesel engine 5. To study the working of four stroke diesel engine 6. To determine volumetric efficiency of a reciprocating compressor and to draw its indicator (P-V) diagram 7. To draw the valve timing diagram for a four stroke diesel engine 8. Performance test of four stroke diesel engine with mechanical loading on test rig
9	Dynamics of Machine Lab. (IME-553 / EME-305)	<ol style="list-style-type: none"> 1. Draw the slider displacement v/s crank angle for a slider crank mechanism 2. To determine the ratio of time and maximum velocities for quick return motion using crank and lever mechanism 3. To study different approximate line drawing mechanisms 4. To determine the ratio of angular speeds of shaft in a Hooke's joint 5. To determine the coefficient of friction between flat belt and pulley 6. To determine the moment of inertia of a plane disc by using a gyroscope 7. Study of quick return mechanism to get ratio of angle for forward stroke to return stroke 8. Determination of forces on a spring in a Hartnell Governor to evaluate the spring stiffness 9. Study of motion of the follower of a given profile of cam and calculation of displacement, velocity and acceleration 10. To study the working of Oldham's coupling 11. To determine the speed ratio for a spur gear 12. Determination of critical speed of the shaft 13. Determination of damping ratio and natural frequencies of a cantilever beam
10	Machine Design-I Lab. (IME-554 / EME-307) in CAD Lab	<ol style="list-style-type: none"> 1. Design and drawing of riveted joints for given operating conditions 2. Design and drawing of an eccentrically loaded welded / riveted / bolted joint 3. Design and drawing of bolted joint subjected to fluctuating loads 4. Design and drawing of a simple screw jack 5. Design of shaft for different loading conditions 6. Design and drawing of rigid flange couplings 7. Design and drawing of a pin-bush type flexible coupling 8. Design and drawing of a leaf spring for an automobile 9. Design and drawing of a helical spring for a given application 10. Exercises / Problems on product design and development
11	Fluid Machinery Lab. (IME-651 / EME-302)	<ol style="list-style-type: none"> 1. To determine the coefficient of impact of jet 2. To determine the efficiency of Pelton turbine 3. To determine the efficiency of Francis turbine 4. To determine the efficiency of Kaplan turbine 5. To determine the efficiency of reciprocating pump

		<ol style="list-style-type: none"> 6. To determine the efficiency of centrifugal pump 7. Study of hydraulic jack / press 8. Study of hydraulic brake 9. To determine the efficiency of hydraulic ram 10. Performance evaluation of different types of pumps and turbines 11. Measurement of drag and lift of aerofoil in wind tunnel 12. To determine the efficiency of jet pumps 13. To determine the efficiency of gear oil pump 14. Visit to a water pumping station
12	Machine Design-II Lab. (IME-652 / EME-304) in CAD Lab.	<p>Learning Computer Language & Programming</p> <p>Introduction to programming in C; Input-output statements, Control statements: if, for, while, switch statement etc., Function and its uses, Structures. Preparation of library file for important design data, material properties and relevant data</p> <p>II. Writing Computer Program for Conventional Design</p> <ol style="list-style-type: none"> 1. Program for designing circular shaft 2. Program for designing helical gear 3. Program for designing bevel gear 4. Program for designing spur gear 5. Program for designing sliding bearing 6. Application of CAD drafting packages 7. Program for designing thick and thin cylindrical pressure vessels. 8. Program for design of crankshaft. <p>III. Design Problem as a Mini Project</p> <p>Students are required to solve a Real Life Design problems. Use of Design Handbook and computer programming is encouraged.</p> <p>IV. 2D and 3D Modeling using Drafting CAD Tool (Creo 2.0)</p>
13	Measurement & Metrology Lab. (IME-654)	<ol style="list-style-type: none"> 1. To measure the taper in a shaft. 2. To measure pitch diameter of a screw thread using three-wire method. 3. To measure thread angle of screw using three-wire method. 4. To measure dimensions of a gear tooth using vernier calipers. 5. Study of slip gauges and limit gauges. 6. Measurement of 'out of roundness' of a shaft. 7. To perform the concentricity test on a spur gear. 8. Calibration of a dial gage. 9. Study and use of autocollimator. 10. Determination of speed of pedestal fan using stroboscope. 11. Calibration and measurement of temperature using thermocouples.
14	CAD / CAM Lab. (IME-751 / EME-421)	<p>I. CAD Exercises:</p> <ol style="list-style-type: none"> 1. Study of translation, rotation and scaling transformations by writing programs. 2. Study of composite transformations by writing programs. 3. Study of straight line generation algorithms by developing programs. 4. Study of circle generation algorithms by developing programs.

		<ol style="list-style-type: none"> 5. Study of 2-D parametric curves such as Bezier curves. 6. Study of modelling features of CREO 2.0 software. 7. Study of FEM by developing a program for 1-D two element system. 8. Study of FEM for 1-D system using FEA software. <p>II. CAM Exercises:</p> <ol style="list-style-type: none"> 1. Study of system / devices such as motors and feedback devices. 2. Study of difference between conventional machine and CNC machine. 3. Writing a part-program (in word address format or in APT) for drilling operation (point-to-point) and to run on CNC machine. 4. Writing a part program (in word address format or in APT) for milling operation (contouring) and other available functions and to run on CNC machine. 5. Writing a part program (in word address format or in APT) for turning operations and to run on CNC machine.
15	Refrigeration & Air-conditioning Lab. (IME-752 / EME-401) in Heat Transfer Lab.	<ol style="list-style-type: none"> 1. To study and perform experiment on refrigeration test rig for calculation of various performance parameters. 2. To study mechanical heat pump and determine the coefficient of performance of the unit working as heat-pump and working as refrigerator. 3. To perform experiment on air-conditioning test rig for calculation of performance parameters. 4. To perform experiments on vapour absorption refrigeration system. 5. To study air washers. 6. To study window air conditioner. 7. To study hermetically sealed compressor. 8. To study working of desert cooler 9. To study different components of air conditioning system. 10. To study different types of expansion devices used in refrigeration system. 11. To study different types of evaporators used in refrigeration systems. 12. To study different types of condensers.
16	Automobile Engineering Lab. (IME-851 / EME-417)	<ol style="list-style-type: none"> 1. Study of braking system models (Cut section model of mechanical brake, hydraulic brake) and working of vacuum assisted brake. 2. Study of steering system models (Worm and worm wheel, rack and pinion type) and working of power steering. 3. Study of lubrication and cooling system in cut section model of petrol engine. 4. Study of five speed gear box and cut section differential gear box. 5. Study of cut section models of multi cylinder petrol engine and multi cylinder diesel engine. 6. Study of fuel supply system for petrol and diesel engines. 7. Study of cut section models of front axle assembly and rear axle assembly. 8. Comparative study of technical features of common small cars (such as Maruti Alto, Maruti WagonR, Hyuindai Creta, Tata Indigo and Honda City). 9. Comparative study of technical features of common scooterette (Honda Activa, Jupitor) and motorcycles (Hero Splendor, Royal Enfield). 10. Comparative study of technical features of common heavy

		vehicles (Tata Bus, Toyota Truck, Mahindra truck) available in India. 11. Visit to an automobile plant.
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