K. S. SCHOOL OF ENGINEERING AND MANAGEMENT

Department of Mechanical Engineering

Design lab

LIST OF EXPERIMENTS

Sl. No.	Experiments
	Part A
1	Determination of natural frequency, logarithmic decrement, damping ratio and damping Co-efficient in a single degree of freedom vibrating systems (longitudinal and torsional)
2	Determination of critical speed of rotating shaft.
3	Balancing of rotating masses
4	Determination of fringe constant of Photo-elastic material using Circular disk subjected diametric compression, Pure bending specimen (four point bending)
5	Determination of stress concentration using Photo elasticity for simple components like Plate with hole under tension or bending, circular disk with circular hole under compression, 2-d crane hook
	PART –B
1	Determination of equilibrium speed, sensitiveness, power and effort ofPorter/ Proel / Hartnell Governor. (at least one)
2	Determination of pressure distribution in Journal bearing
3	Determination of principle stresses and strain in a member subjected to combined loading using strain rosettes.
4	Determination of stresses in curved beam using strain gauge.
5	Experiments on Gyroscope (Demonstration only)

Professor & Head
Department Of Mechanical Engineering
K.S. Group Of Institutions
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Computer Aided Manufacturing lab

LIST OF EXPERIMENTS

Sl. No.	Experiments
	Part A
1	**Manual CNC part programming** for 2 turning and 2 milling parts.Selection and assignment of tools, correction of syntax and logical errors, and verification of tool path.
2	**CNC part programming using CAM packages**. Simulation of Turning, Drilling, Milling operations. 3 typical simulations to be carried out using simulation packages like: **CademCAMLab-Pro, Master- CAM.**
3	Program generation using software. Optimize spindle power, torque utilization, and cycle time. Generation and printing of shop documents like process and cycle time sheets, tool list, and tool layouts.Cut the part in single block and auto mode and measure the virtual part on screen. Post processing of CNC programs for standard CNC control systems like FANUC, SINUMERIC and MISTUBISHI.
	Part B
1	**(Only for Demo/Viva voce)** **FMS (Flexible Manufacturing System)**: Programming of Automatic storage and Retrieval system (ASRS) and linear shuttle conveyor Interfacing CNC lathe, milling with loading unloading arm and ASRS to be carried out on simple components.
2	**(Only for Demo/Viva voce)** **Robot programming:** Using Teach Pendent & Offline programming to perform pick and place, stacking of objects (2 programs).
3	**Pneumatics and Hydraulics, Electro-Pneumatics:** 3 typical experiments on Basics of these topics to be conducted.

Professor & Head
Department Of Mechanical Engineering
K.S. Group Of Institutions
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Computer Aided Modelling and Analysis lab

LIST OF EXPERIMENTS

Sl. No	Experiments
	Part A
1	Bars of constant Cross section area, tapered cross section area and stepped bar
2	Trusses
3	Beams – Simply supported, Cantilever, beams with Point Load, UDL and varying load
4	Stress analysis of a rectangular plate with a circular hole
	Part B
1	Thermal Analysis – 1D & 2D Problems with conduction and convection boundary conditions
2	Dynamic analysis to find: a. Natural Frequency of beam with fixed – fixed end condition b. Response of beam with fixed – fixed end conditions subjected to forcing function c. Response of Bar subjected to forcing functions

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Heat Transfer lab

LIST OF EXPERIMENTS

Sl. No	Experiments
	Part A
1	Determination of Thermal conductivity of Metal rod
2	Determination of Overall heat transfer coefficient of a Composite wall
3	Determination of Effectiveness on a Metallic Fin
4	Determination of Heat transfer coefficient in Free convection
5	Determination of Heat transfer coefficient in Forced convection
6	Determination of Emissivity of a surface
	Part B
1	Determination of Stefan-Boltzmann constant
2	Determination of LMTD and effectiveness in a Parallel and counter flow Heat Exchangers
3	Experiments on Boiling of Liquid and condensation of Vapour
4	Performance Test on a Vapour Compression Refrigeration
5	Performance Test on a Vapour Compression Air-conditioner
6	Experiment on Transient conduction Heat Transfer

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Energy Conversion lab

LIST OF EXPERIMENTS

Sl.No.	Experiments
	Part A
1	Determination of Flash point and Fire point of lubricating oil using Abel Pensky and Marten's (closed) / Cleveland's (Open Cup) Apparatus
2	Determination of Calorific value of solid, liquid and gaseous fuels.
3	Determination of Viscosity of lubricating oil using Redwoods, Saybolt and Torsion Viscometers
4	Analysis of moisture, volatile matter, ash content and fixed carbon of solid and liquid fuel samples
5	Valve Timing/port opening diagram of an I.C. Engine.
	Part B
1	Performance Tests on I.C. Engines, Calculations of IP, BP, Thermal efficiency, Volumetric efficiency, Mechanical efficiency, SFC, FP, A:F Ratio, heat balance sheet for a. Four stroke Diesel Engine b. Four stroke Petrol Engine c. Multi Cylinder Diesel/Petrol Engine, (Morse test) d. Two stroke Petrol Engine
2	Measurements of Exhaust Emissions of Petrol engine.
3	Measurements of Exhaust Emissions of Diesel engine
4	Demonstration of $p\theta$, pV plots usingComputerized IC engine test rig
	PART C(Optional)
1	Visit to Automobile Industry/service stations.
2	CFD Analysis of design, development, performance evaluation and process optimization in I C Engines

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Fluid Mechanics and Machinery lab

LIST OF EXPERIMENTS

Sl. No	Experiments
	Part A
1	Determination of coefficient of friction of flow in pipes
2	Determination of minor losses in flow through pipes
3	Application of momentum equation for determination of coefficient of impact of jets on flat and curved blades
4	Calibration of flow measuring devices a. Venturimeter b. Orifice meter c. Nozzle meter d. V-Notch
	Part B
1	Performance on hydraulic Turbines a. Pelton wheel b. Francis Turbine c. Kaplan Turbines
2	Performance hydraulic Pumps a. Single stage and Multi stage centrifugal pumps b. Reciprocating Pump
3	Performance test on a two stage Reciprocating Air Compressor
4	Performance test on an Air Blower
	PART C(Optional)
1	Visit to Hydraulic Power station/ Municipal Water Pump House and Case Studies
2	Demonstration of cut section models of Hydraulic turbines and Pumps.

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Machine shop and Workshop Practice

LIST OF EXPERIMENTS

Sl. No	Experiments
	Part A
1	Preparation of at least two fitting joint models by proficient handling and application of hand tools- V- block, marking gauge, files, hack saw drills etc.
	Part B
2	Preparation of three models on lathe involving - Plain turning, Taper turning, Step turning, Thread cutting, Facing, Knurling, Drilling, Boring, Internal Thread cutting and Eccentric turning. Exercises should include selection of cutting parameters and cutting time estimation.
	Part C
3	Cutting of V Groove/ dovetail / Rectangular groove using a shaper. Cutting of Gear Teeth using Milling Machine. Exercises should include selection of cutting parameters and cutting time estimation.
	PART D (DEMONSTRATION ONLY)
	Study & Demonstration of power tools like power drill, power hacksaw, portable hand grinding, cordless screw drivers, production air tools, wood cutter, etc., used in Mechanical Engineering.

DISPLAY LOCATION:

NAME	QUANTITY	SIZE
Workshop and Machine shop Practice	1	*36"x48"*

Professor & Head
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Mechanical Measurements and Metrology lab

LIST OF EXPERIMENTS

Sl. No.	Experiments
	Part A
1	Calibration of Pressure Gauge
2	Calibration of Thermocouple
3	Calibration of LVDT
4	Calibration of Load cell
5	Determination of modulus of elasticity of a mild steel specimen using straingauges.
	Part B
6	Measurements using Optical Projector / Tool makers' Microscope.
7	Measurement of angle using Sine Centre / Sine bar / bevelprotractor
8	Measurement of alignment using Autocollimator / Rollerset
9	Measurement of cutting tool for cesusing:
10	Measurements of Screw thread parameters using two wire or three-wire methods.
11	Measurements of surface roughness using Tally Surf/Mechanical Comparator
12	Measurement of gear tooth profile using gear tooth Vernier/Gear tooth micrometer
13	Calibration of Micrometer using slip gauges
14	Measurement using Optical Flats

Professor & Head
Department Of Mechanical Engineering
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Foundry, Forging and Welding lab

LIST OF EXPERIMENTS

Sl. No.	Experiments
	Part A
1	**Testing of Molding sand and Core sand.** **Preparation of sand specimens and conduction of the following tests:** 1. Compression, Shear and Tensile tests on Universal Sand Testing Machine. 2. Permeability test 3. Sieve Analysis to find Grain Fineness Number (GFN) of Base Sand 4. Clay content determination on Base Sand. **Welding Practice:** Use of Arc welding tools and welding equipment Preparation of welded joints using Arc Welding equipment L-Joint, T-Joint, Butt joint, V-Joint, Lap joints on M.S. flats
	Part B
2	**Foundry Practice:** **Use of foundry tools and other equipment for Preparation of molding sand mixture. Preparation of green sand molds kept ready for pouring in the following cases:** 4. Using two molding boxes (hand cut molds). 5. Using patterns (Single piece pattern and Split pattern). 6. Incorporating core in the mold.(Core boxes). • Preparation of one casting (Aluminium or cast iron-Demonstration only)
	Part C
3	**Forging Operations:** Use of forging tools and other forging equipment. • Calculation of length of the raw material required to prepare the model considering scale loss. • Preparing minimum three forged models involving upsetting, drawing and bending operations.

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Material Testing lab

LIST OF EXPERIMENTS

Sl. No.	Experiment
	Part A
1	Preparation of specimen for Metallographic examination of different engineering materials. To report microstructures of plain carbon steel, tool steel, gray C.I, SG iron, Brass, Bronze & composites.
2	Heat treatment: Annealing, normalizing, hardening and tempering of steel. Metallographic specimens of heat treated components to be supplied and students should report microstructures of furnace cooled, water cooled, air cooled, tempered steel. Students should be able to distinguish the phase changes in a heat treated specimen compared to untreated specimen.
3	Brinell, Rockwell and Vickers's Hardness tests on untreated and heat treated specimens.
4	To study the defects of Cast and Welded components using Non-destructive tests like: d) Ultrasonic flaw detection e) Magnetic crack detection f) Dye penetration testing.
	Part B
5	Tensile, shear and compression tests of steel, aluminum and cast iron specimens using Universal Testing Machine
6	Torsion Test on steel bar.
7	Bending Test on steel and wood specimens.
8	Izod and Charpy Tests on Mild steel and C.I Specimen.
9	To study the wear characteristics of ferrous and non-ferrous materials under different parameters.
10	Tensile, shear and compression tests of steel, aluminum and cast iron specimens using Universal Testing Machine
11	Fatigue Test (demonstration only).

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