Chhattisgarh Swami Vivekanand Technical University, Bhilai	
Name of program: **Bachelor of Technology**	Semester:**VI**
Branch: **Mechanical Engineering**	Code: **C037611(037)**
Subject :**Design of Machine Elements**	TotalTutorialPeriods:**01**
TotalTheoryPeriods:**03**	MaximumMarks**:100**
ClassTests:**Two(Minimum)**	MinimumMarks:**35**
Assignments:**Two(Minimum)**	ESEDuration:**FourHours**

Course Objectives: The objective of this course is to teach students how to apply the concepts of stress analysis, theories of failure and material science analyze/ design commonly used machine components.

UNIT-I	**GeneralConsiderations:**SelectionofMaterials,DesignStress,FactorofSafety,Stressconcentrationfactor intension,bendingandtorsion,theoriesof failures.Notchsensitivity,designstressforvariableand repeatedloads,fatiguestressconcentrationfactor,endurancediagrams.
UNIT-II	**Mechanical Joints:** Design of socket pigot cotter joint, design of sleeve and cotter joint ,design of Knuck le joint. **KeysandSplines:**Types ofkeys,designofkeys,designofsplines. **Couplings:** Types of couplings, design of flange and flexible couplings, compression coupling, muff coupling.
UNIT-III	**Shafts and Axles :** Transmission shaft, Design against static load, Design for strength, rigidity and stiffness, design under continuous loading for fatigue. **Clutches:** Friction clutches, Friction materials, Torque transmitting capacity, Single & Multiple plate clutch, centrifugal clutches.
UNIT-IV	**Threaded Fasteners:** Geometry of thread forms, terminology of screw threads and thread standards,specifications of steel bolts, initial tension, and relation between bolt tension and torque, design ofstaticallyloadedtensionjoints,designofboltedjointsduetoeccentricloading. **Power Screws:** Powerscrews,Forceanalysis-squareandtrapezoidalthreads,Collarfriction,Stressesin screw,coefficientoffriction,efficiencyof thread.
UNIT-V	**Riveted Joints:** Types of rive threads, types of riveted joints, failure of riveted joint , strength of rivet joint, efficiency of riveted joint, design of riveted joint for boiler. **Welded Joints:** Types of welded joints, stresses in butt and fillet welds, strength of welded joints, location and dimension of weld design, eccentrically loaded joint, welded joint subjected to bending moment ,design procedure, fillet weld sunder varying loads, stress relieving techniques.

Text Books:

1.	Design of Machine Elements-V.B.Bhandari- TMH,NewDelhi
2.	Mechanical Engineering Design-Shigley– McGrawHill,Delhi

Reference Books:	
1.	Machine Design-Moving– MIR Publishers, Moscow
2.	Machine Design-Fundamental & Application–Gope–PHI,NewDelhi
3.	Machine Design-Sharma & Agrawal– Katson,NewDelhi
4.	Principles of Mechanical Design-R. Phelan–McGrawHill,NewDelhi.
5.	MachineDesign–Sundarajamoorthy&Shanmugum–AnuradhaAgencies,Chennai

CourseOutcomes:	
Onsuccessfulcompletionofthecourse,thestudent willbeableto:	
1.	Select proper material for specific application with proper assumptions with respect to design stress, factor of Safety, stress concentration factor and theory of failure.
2.	Design and analyze Mechanical Joints, keys and couplings.
3.	Design and analyze shafts, axle and clutches.
4.	Design and analyze threaded fastener and power screws.
5.	Design and analyze riveted and welded joint.

Chhattisgarh Swami Vivekanand Technical University,Bhilai	
Name of program: **Bachelor of Technology**	Semester:**VI**
Branch: **Mechanical Engineering**	Code: **C037612(037)**
Subject :**Manufacturing Technology**	Total Tutorial Periods:**01**
Total Theory Periods:**03**	Maximum Marks**:100**
Class Tests: **Two (Minimum)**	MinimumMarks:**35**
Assignments:**Two(Minimum)**	ESE Duration: **Three Hours**

CourseObjectives:

To impart basic knowledge and understanding about grinding, surface finishing, unconventional machining, bulk metal forming and sheet metal forming.

UNIT-I	**Grinding:** Processes. Grinding wheels, compositions- abrasives, bonding materials. Grinding wheel characteristics-abrasive type, grain size, bonding material, structure, and grade. Wheel specification and selection. Wheel life. Types of grinding operations, design consideration for grinding, specification of grinding wheel, process ,parameters, economics of grinding. Surfacefinishingoperations:Honing,lapping,superfinishing,polishing,buffing,processparameters andattainablegradesofsurfacefinish
UNIT-II	**Unconventional Machining:** Advantages, application and limitation, Processes-Electro Discharge Machining(EDM), Electro Chemical Machining(ECM),Ultrasonic Machining(USM), Abrasive Jet Machining (AJM),Electron Beam Machining (EBM), Laser Beam Machining (LBM), Electro Chemical grinding(ECG). Mechanics of metal removal, tooling, equipment ,process parameters and surface Finish obtained & specific applications
UNIT-III	**Introduction to metal forming:** Classification, Hot and Cold working. **Forging:** Principle. Forging operations, drawing out and upsetting. Types of forging method-smith,drop, press and machine forging. Forging equipment. Forging dies. Tools and fixture of forging, forgingdies. Forging design, Forging designs factors. Drop forging die design, Upset forging die design. Forgingpractice–sequenceofsteps.Forgingdefects.Inspectionandtestingofforgedparts. **Extrusion:**Principle,extrusionprocesses-hotextrusion,coldextrusions. Process parameters.Extrusion equipment.Extrusionofseamlesstubes.Extrusiondefects.
UNIT-IV	**Rolling:** Principle, classification of rolled products, Types of rolling mills, rolling mill train components,Rollpass sequences-break down passes, roughing passes, finishing passes.Rollpasses design forcontinuous mill. Roll separating force. Rolling load calculation. Power required in rolling. Effect of frontand back tensions. Effect of friction. Shape rolling operations-ring rolling, thread rolling. Defects inrolledproducts. **Drawing:** Principle. Wire drawing, tube drawing. Drawing equipments and dies. Calculation of drawingloadandpowerrequirement

UNIT-V	**Sheet metal forming:** Types of presses, Selection of press, component sofa simple press, press working operations shear, bending. Shearing operations: Blanking, piercing ,trimming, shaving, nibbling and notching. Calculation of punching force and shear force. Punch and die size calculation.**Drawingoperation:**Principleofoperation.Drawdiesdesign. **Bending operation:** Principle of operation. Bend allowances .Bending force.Length of sheet estimation. Bendradius.Springbackeffect.Otheroperation:Spinning.Stretchforming,Embossing andCoining.

TextBooks:	
1.	Manufacturing Technology(Vol.-I&II)–P.N.Rao–Tata McGraw Hill Pub. Company, NewDelhi
2.	A Text Book of Production Technology(Manufacturing Processes)–P.C.Sharma–S.Chand

ReferenceBooks:	
1.	Manufacturing Engineering and Technology –S.Kalpakjian & S.R.Schmid– AWL,NewDelhi
2.	Tool Engineering & Design–G.R.Nagpal–Khanna Publishers–New Delhi
3.	A Text Book of Production Technology–O.P.Khanna – Dhanpat Rai&Sons, New Delhi
4.	Manufacturing Science – A.Ghosh & A.K. Mallik –East West Press Pvt.Ltd.,NewDelhi
5.	Production Technology–R.K.Jain–Khanna Publishers, New Delhi

CourseOutcomes:	
On successful completion of the course, the student will be able to:	
1.	Explain the principles and techniques of grinding and other surface finishing operations.
2.	Explain the principles and appropriateness of unconventional machining processes and analyze related Process parameters.
3.	Describe the principles and techniques of forging and extrusion operations, determine their suitability and Analyze related process parameters.
4.	Describe the principles and techniques of rolling and drawing operations and be able to analyze related Process parameters.
5.	Describe the principles and techniques of sheet metal forming operation and be able to analyze related Process parameters.

Chhattisgarh Swami Vivekanand Technical University,Bhilai	
Name of program :**Bachelor of Technology**	Semester:**VI**
Branch: **Mechanical Engineering**	Code: **C037613(037)**
Subject: **Heat & Mass Transfer**	Total Tutorial Periods:**01**
TotalTheoryPeriods:**03**	MaximumMarks**:100**
ClassTests:**Two(Minimum)**	Minimum Marks: **35**
Assignments:**Two(Minimum)**	ESEDuration:**ThreeHours**

CourseObjectives:

The main objective of the course is to impart an understanding of the governing laws for heat and mass transfer; The focusison explaining steady state and transient conduction ,convection, heat transfer with phase change (boiling/condensation),heat exchangers ,radiation and mass transfer.

UNIT-I	**Introduction:**Heat transfer, Difference between heat transfer and thermodynamics, Various modes ofheattransfer,Fourier's,Newton'sandStefanBoltzman'sLaw,Combinedmodesofheattransfer,thermal diffusivity, overall heat transfer coefficient. The thermal conductivity of solids, liquids andgases,factorsinfluencingconductivity **Conduction:** Heat conduction without heat generation: Derivation of general differential equation ofheat conduction in Cartesian co-ordinate. One dimensional steady state conduction, linear heat flow through a plane and composite wall,heat conduction without heat generation in cylinder and sphere, Critical thickness of insulation. Conduction with heat generation in flat wall and solid cylinder.
UNIT-II	**Heat transfer from extended surface (Fins):**Types of fins, Fin equation for uniform cross sectional area(rectangular profile), Solution for infinite length, negligible heat loss from fin tip, finite long and heat transfer from fin tip .Fine effectiveness and efficiency . Error in temperature measurement from thermometer. **Transient/Unsteady State Heat Conduction:** Lumped system analysis ,criteria for lumped system analysis ,solution of transient heat conduction in large plane wall ,long cylinder sand sphere through Heisler`schart.
UNIT-III	**Forced Convection:** Physical Mechanism of Forced Convection, Dimensional analysis for forced convection, velocity and Thermal Boundary layer, Flow over plates, Flow across cylinders and spheres,Flowintubes,Reynold'sanalogy. **Natural Convection:** Physical Mechanism of Natural Convection ,Dimensional analysis of natural convection; empirical relationship for natural convection.
UNIT-IV	**Two Phase Heat Transfer:** Boiling heat transfer, Pool boiling, boiling regimes and boiling curve, heattransfer correlations in pool boiling. Condensation heat transfer, Film condensation, derivation for theaverage heat transfer coefficient 'h' for the case of laminar film condensation over vertical plate, Heat transfer correlation for inclined plates, vertical tubes, Horizontal bank tubes. **IntroductiontoMassTransfer:**Massandmoleconcentrations,moleculardiffusion,eddydiffusion, Molecular diffusion from an evaporating fluid surface, Introduction to mass transfer in laminar and turbulent convection Combined heat and mass transfer, the wet and dry bulb thermometer.

UNIT-V	**Heat Exchangers:** Different types of heat exchangers; Determination of heat exchanger performance, Heat exchanger transfer units, Analysis restricted to parallel and counter flow heat exchanger (LMTDandNTU method). **Thermal Radiation:** Introduction, absorbtivity, reflectivity & transmissivity. Concept of black body &grey body. Emissive power of surface, Kirchhoff's law, emissivity, Concept of shape factor. Radiat heat exchange between two parallel grey surface and concentric cylinders. Errors in temperature Measurement due to radiation. Concept of irradiation and radiosity.

TextBooks:	
1.	Heat Transfer–S.P.Sukhatme–TMH,Delhi
2.	Heat & Mass Transfer–D.S.Kumar–S.K. Kataria & Sons, Delhi

ReferenceBooks:	
1.	Heat transfer-C PArora,T MH ,Delhi
2.	Heat & Mass Transfer–R,Yadav,Central Publishing House,Allahabad
3.	Heat & Mass Transfer–R.K. Rajput,S.Chand,Delhi
4.	Heat & Mass Transfer–P.K. Nag,TMH,Delhi
5.	HeatTransfer–J.P.Holman–TMH,Delhi
6.	Heat Transfer–A Practical Approach–Yunus A. Cengel –Mc GrawHill, Delhi
7.	Heat Transfer–P.S.Ghosh dastidhar–Oxford University Press
8.	Heat And Mass Transfer Fundamentals And Applications-Cengel, Yunus,A and A J Ghajar,T MH,Delhi
9.	A Course In Heat And Mass Transfer-S.C. Arora & S Donkundwar,S- DhanpatRai, Delhi
10.	Heat and Mass Transfer Data Book-C.P.Kothandaraman C.P. &S. Subramanyan,NewAge, Delhi

CourseOutcomes:	
Onsuccessfulcompletionof thecourse,thestudentwillbeableto:	
1.	Explain the principles of heat transfer due to conduction, convection and radiation and analyze problems Related to conduction.
2.	Analyze problems related to heat transfer from extended surfaces and unsteady state heat conduction.
3.	Analyze problems related to forced convection and natural convection.
4.	Apply basic concepts of phase change processes and principles of mass transfer to solve relatedpractical problems.
5.	Analyzeheatexchangersandproblemsrelatedtoradiation.

ChhattisgarhSwamiVivekanandTechnicalUniversity,Bhilai	
Name of program: **Bachelor of Technology**	Semester:**VI**
Branch: **Mechanical Engineering**	Code: **C037631(037)**
Subject: **Finite Element Analysis**	Total Tutorial Periods:**01**
Total Theory Periods: **02**	Maximum Marks**:100**
Class Tests: **Two(Minimum)**	Minimum Marks:**35**
Assignments: **Two (Minimum)**	ESE Duration: **Three Hours**

CourseObjectives:

To introduce importance and applications of Finite Element Method /analysis and learn to apply to formulate fundamental engineering problems related to solid mechanics and heat transfer.

UNIT-I	**Introduction to finite element analysis:** Basic concepts of finite element analysis, steps infinite element analysis, finite element formulationtechniques:weightedresidualmethod,Ritztechnique,stiffness Matrix and boundary conditions. Numerical integration-one and two dimensional.
UNIT-II	**One-dimensional problems:** One dimensional second order equations dis cretization, element types-linear and higher order elements, derivation of shape functions and stiffness matrices and force vectors, assembly of matrices, solution of problems from solid mechanics and heat transfer .Direct formulation Of spring mass system.
UNIT-III	**Beam and truss elements:** Finite element formulation for linear static analysis of solids and structures: Beam and frame element, solutions of problems from beam and frame.
UNIT-IV	**Two dimensional scalar variable problems:** Second order 2D equations involving scalar variable functions, variational formulation, finite element formulation, triangular and quadrilateral elements – shape functions and element matrices, application of field problems-thermal problems, torsion of non Circular shafts.
UNIT-V	**Two dimensional vector variable problems:** Equations of elasticity, plane stress ,plane strain and Axis symmetric problems, body forces and temperature effects, stress calculations–plate and shell elements.

Text Books:	
1.	ReddyJN; An introduction to finite element method;TMH
2.	SeshuP; Text book of Finite Element Analysis; PHI.

Reference Books:	
1.	A First Course in Finite element Method; Logan DL; Cegage
2.	Finite Element Analysis, theory and programming; Krishnamoorthy;TMH
3.	Fundamentals of Finite Element Analysis;Hutton D; TMH
4.	The Finite Element Method in Engineering ;Rao ,S.S.,Peragamon Press, Oxford.
5.	Introduction to Finite Elements in Engineering ,Chandrupatla,T.R.and Belegundu,A.D.,PHI

Course Outcomes:	
On successful completion of the course, the student will be able to:	
1.	Describe the concepts of finite element formulations.
2.	Solve one dimensional solid mechanics and heat transfer problems.
3.	Solve one dimensional beam and frame element.
4.	Describe two dimensional elements and solve for thermal and tensional problems
5.	Solve problems related to plate and shell elements.

Chhattisgarh Swami Vivekanand Technical University, Bhilai	
Name of program: **Bachelor of Technology**	Semester: **VI**
Branch: **Mechanical Engineering**	Code: **C037632(037)**
Subject: **Power Plant Engineering**	Total Tutorial Periods: **01**
Total Theory Periods: **02**	Maximum Marks**: 100**
Class Tests: **Two (Minimum)**	Minimum Marks: **35**
Assignments: **Two (Minimum)**	ESE Duration: **Three Hours**

Course Objectives:

The objective of this course is to provide an overview of power plants and the associated energy conversion issues.

UNIT- I	**Elements of Power Plant:** General Sources of power, Importance of Central Power Stations, types of power stations – steam, nuclear, diesel and hydro – Elements of modern power stations (Steams only) brief layout and arrangement of elements and complements, sitting of different power stations, foundation. Elements of Electric power systems primary and secondary distribution substations.
UNIT-II	**Steam Power Plant:** Steam power plants, selection of working medium, Heat Balance in steam cycles, Heat rates, comparison of efficiencies gas loop, fuels and fuel handling. Equipment's, fuel gas cleaning and ash handling. Air pre-heater, feed water pre-heaters, steam re-heaters, deaerators, feed water treatment, pumping and regulation water walls, modern developments in steam boilers, Important instrumentation and piping of gas and water loop. Factors to be controlled from maximum efficiency and variable output.
UNIT- III	**Hydro Electric power station:** Potential power with reference to rainfall and catchments area, Water storage, equipment used in hydroelectric power stations. Characteristics of hydraulic turbines. Comparison of the factors governing the cost of hydro steam and diesel power stations. **Diesel power station**: Suitability of diesel engines for bulk power, advantages and limitations of diesel, power stations, efficiency and heat balance.
UNIT- IV	**Nuclear Power Station**: Evolution of nuclear energy from atoms by fission and fusion. Chain reactions, fission materials, types of reactors, gas cooled, boiling water liquid, metal cooled and fast reactor, arrangements of various elements in a nuclear power station, stem cycles and boilers coolant heat exchangers, Reactor control,Reactor shielding and safety methods.
UNIT-V	**Variable load problems**: Idealized and realized load curves, effect of variable load on plant design and operation variable load operation and load dispatch. **Power station Economics**: Source of income, cost of plant and production, elements of cost, depreciation and replacement theory of rates

Text Books:	
1.	Power Plant Engineering – P.K. Nag – Tata McGraw-Hill Pub. Com., New Delhi
2.	Power Plant Technology - M. M. El-wakil– Tata McGraw-Hill

Reference Books:	
1.	Power Plant Engineering - Elliot T.C., Chen K and Swanekamp R. C.- McGraw Hill.
2.	Text Book of Power Plant Engineering – R.K. Rajput – Laxmi Publications
3.	Power Plant Engineering – P.C. Sharma – S.K. Kataria& Sons
4.	Power Plant Engineering – G.R. Nagpal – Khanna Publishers
5.	Steam and gas turbine and power plant engineering- R. Yadav-CPH Allahabad
6.	A Course in Power Plant Engineering – S.C. Arora, S.Domkundwar – Dhanpat Rai & Co.

Course Outcomes:	
On successful completion of the course, the student will be able to:	
1.	Describe the elements of power plant.
2.	Describe the working principle and basic components of steam power plants and analyze and its working .
3.	Describe the working principle and basic components of hydro electric and diesel power stationand analyze its working.
4.	Describe the working principle and basic components of nuclear power stationand analyze and its working.
5.	Discuss variable load problems and power station economic

ChhattisgarhSwamiVivekanandTechnicalUniversity,Bhilai	
Name of program: **Bachelor of Technology**	Semester:**VI**
Branch: **Mechanical Engineering**	Code: **C037633(037)**
Subject: **Maintenance and Reliability**	Total Tutorial Periods:**01**
Total Theory Periods:**02**	Maximum Marks**:100**
Class Tests: **Two (Minimum)**	Minimum Marks:**35**
Assignments: **Two(Minimum)**	ESE Duration:**ThreeHours**

Course Objectives: The objective of this course is to impart an understanding of fundamentals of maintenanceand reliability engineering; the application of concepts of the course leads to the optimization of equipment, procedures, and departmental budgets to achieve better maintain ability, reliability ,and availability of equipment.

UNIT-I	**Maintenance Engineering:** Objective and functions, organization and administration, economics and maintenance policies . Types of maintenance systems-planned, unplanned, preventive, predictive, conditional monitoring, total predictive maintenance.
UNIT-II	**Failure Analysis:** Analysis of source, identification, classification and selectivity of failures, catastrophic, wear out and cumulative failures, failure rate Mortality distribution, statistical and reliability concept of failure analysis, equipment replacement policy.
UNIT-III	**Reliability Engineering:** Concept, bath tubcurve, elements, Hazard Models-constant, linearly increasing, weibull. System Reliability-Series configuration,parallel configuration, mixed configuration, reliability improvement – Improvement of components, Redundancy – element, unit, stand by, repairable and nonrepairable systems, reliability, availability, maintain ability, MTBF, MTTR, reliability allocation for simple series system.
UNIT-IV	**Maintenance Management:** Maintenance planning, maintenance scheduling, work orders, workmeasurement, maintenance cost budgeting, store and spare control, maintenance planning and control techniques,Incentives for maintenance work.
UNIT-V	**Maintenance of Mechanical System:** Introduction, Bearings, Friction Clutches, Couplings, Fastening Devices, Chains, Gear Drives ,Support Equipment, Cooling Towers.

Text Books:	
1.	Reliability, Maintain ability and Risk: Practical Methods for Engineer-David J.Smith- Elsevier Science
2.	Maintenance Engineering & Management–R.CMishra, K.Pathak–Prentice Hall of India, New Delhi

Reference Books:	
1.	Maintenance Engineering Handbook- by Keith Mobley, Lindley Higgins, Darrin Wikoff ,McGraw-Hill
2.	Maintenance Engineering–S.Shrivastava–S.Chand &Sons–New Delhi
3.	Industrial Maintenance–H.P.Garg–S.Chand Publication,New Delhi
4.	Maintenance Planning &Control–A.Kelly–TMH, New Delhi
5.	Concept in Reliability–LS.Srinath–Affiliated East- West Press,NewDelhi

Course Outcomes:	
On successful completion of the course, the student will be able to:	
1.	Explain the basic concepts and types of maintenance systems
2.	Describe failure analysis and equipment replacement.
3.	Apply their liability tools and techniques.
4.	Describe the various concepts of maintenance management.
5.	Discuss various tools for maintenance of mechanical system.

Chhattisgarh Swami Vivekanand Technical University,Bhilai	
Name of program: **Bachelor of Technology**	
Branch: **Mechanical Engineering**	Semester:**VI**
Subject: **Design of Machine Element Lab**	Code: **C037621(037)**
Total Lab Periods: **48**	Batch Size–**30**
Maximum Marks**:40**	Minimum Marks:**20**

Course Objectives: The primary objective of this course is to learn how the principles learned in theory courses are applied to provide design solution.

List of Experiments/Activities

1.	Select a product used in day to day life and design the conceptual design by applying the design process taking the controllingparameters
2.	Make a list of mechanical components studied in and list out their materials and suggest some alternative materials for the each one of them.
3.	Design cotter joint and knuckle joint for given loading condition
4.	Find a flange coupling in the college laboratory and justify its design by actual measurements
5.	Design a shaft used in some practical application ,by actual working and loading conditions
6.	Justify the design of single plate clutch of an engine assembly
7.	Design a wall bracket, which is being used in real life by actual measurement of load using : a) Weldedjoints b) Riveted and bolted joints c) In addition, justify your findings.
8.	Design a screw jack.
9.	Design a machine element by using any software in some high level language or excel sheets for design of a component
10.	**Mini Project: Student team od maximum four students** will be given a real life problem for the complete design of a subsystem/system using either manual calculation with the help of design handbook or through computer programme, if needed. The report in given format will be submitted at the end of semester.

Course Outcomes:	
On successful completion of the course, the student will be able to:	
1.	Design a daily use product by applying the conceptual design process and able to suggest some alternative material for it.
2.	Design Flange coupling/ shaft/ single plate clutch/screw jack used in practical application and justify its design
3.	Design welded joint/riveted joint/ bolted joint used in real life and justify its design.
4.	Design machine element using software.
5.	Design complete system/subsystem using design hand book and/or design software.

Chhattisgarh Swami Vivekanand Technical University, Bhilai	
Name of program: **Bachelor of Technology**	
Branch: **Mechanical Engineering**	Semester:**VI**
Subject: **Computer Aided Modeling & Analysis Lab**	Code: **C037622(037)**
Total Lab Periods:**48**	Batch Size–**30**
Maximum Marks**:40**	Minimum Marks:**20**

Course Objectives: The objective of this course is to develop skills among students to use modeling software to create 2D and 3D models of simple mechanical parts and analysis using modern tools.

List of Experiments

***(At least five exercises are to be* completed from each part)**

Part-I: Computer Aided Modeling	
1.	Introduction to modeling software ,and its working procedure.
2.	Discuss various CAD tools required to model the engineering problems such as extrusion, rotation, sweep, Boolean algebra etc.
3.	Modeling of part for structural problem such as bar,beam ,frame etc.
4.	Modeling of part for heat transfer problem such as plate ,shell etc.
5.	Modeling of part for fluid flow problems such as pipes, mixing elbow, flow over cylinder etc.
6.	Practice with 3D model like butterfly assembly, sprocket etc.
Part-II:Analysis	
1.	Introduction to analysis software and its working procedure.
2.	Discuss structural module of the software and mesh generation.
3.	Discuss CFD module of the software and mesh generation.
4.	Analysis of structural problem.
5.	Analysis of heat transfer problem.
6.	Analysis of fluid flow problem.

Note:

1. Computer aided modeling software Such as Creo, solidworks,Catiaetc.
2. Lab operating requirements: Computer system with good configuration depending upon the requirement of software .

Course Outcomes:	
On successful completion of the course, the student will be able to:	
1.	Demonstrate working knowledge in Computer Aided Design methods and procedures.
2.	Construct solid modeling using 3D modeling standard software.
3.	Describe boundary conditions for structural, heat and fluid flow problems.
4.	Solve simple structural and heat problems using standard FEA software.
5.	Solve fluid flow problems using standard FEA software.

Chhattisgarh Swami Vivekanand Technical University,Bhilai	
Name of program: **Bachelor of Technology**	
Branch: **Mechanical Engineering**	Semester:**VI**
Subject: **Heat & Mass Transfer Lab**	Code: **C037623(037)**
Total Lab Periods:**48**	Batch Size–**30**
Maximum Marks**:40**	Minimum Marks:**20**

Course Objectives: The objective of this laboratory course is to further rein force the students' under standing of the analysis of applications pertaining to Heat and Mass Transfer through suitably designed experiments.

List of Experiments:*(At least Ten experiments are to be performed by each student)*	
1.	To Determine Thermal Conductivity of Insulating Powders.
2.	To Determine Thermal Conductivity of a Good Conductor of Heat (Metal Rod).
3.	To Measure the thermal Conductivity of Liquid.
4.	To determine the transfer Rate & Temperature Distribution For a Pin Fin.
5.	To Measure the Emmissivity of the Test plate Surface.
6.	To Determine Stefan Boltzman Constant of Radiation Heat Transfer.
7.	To Determine the Surface Heat Transfer Coefficient For Heated Vertical Cylinder in Natural Convection.
8.	Determination of Heat Transfer Coefficient in Drop Wise & Film Wise condensation.
9.	To Determine Critical Heat Flux in Saturated Pool Boiling.
10.	To Study Performance of Simple Heat Pipes.
11.	To Study and Compare LMTD and Effectiveness in Parallel and Counter Flow Heat Exchangers.
12.	To Find the Heat transfer Coefficient in Forced Convection in a tube.
13.	To determine the total thermal conductivity and thermal resistance of the given compound resistance in series.
14.	To find out the thermal conductivity of given slab material.
15.	To determine the individual thermal conductivity of different lagging in a lagged pipe
16.	To study the rates of heat transfer for different materials and geometries
17.	To understand the importance and validity of engineering assumptions through the lumped heat capacity method.
18.	Testing and performance of different heat insulators

List of Equipment/Instruments/Machines/SoftwareRequired:	
1.	Thermal Conductivity of Insulating Powder Apparatus
2.	Thermal Conductivity of Metal Bar Apparatus
3.	ThermalConductivityofLiquidApparatus
4.	Transfer Rate and Temperature Distribution For A Pin Fin Apparatus

5.	Emmissivity of The Test Plate Surface And Plotting A Graph of Emmissivity Versus Temperature Apparatus
6.	Stefen-Boltzman Constant Of Radiation Of Heat Transfer Apparatus
7.	Surface Heat Transfer Coefficient For Heated Vertical Cylinder in Natural Convection Apparatus
8.	Heat Transfer Coefficient In Drop Wise And Film Wise Condensation Apparatus
9.	Critical Hat Flux In Saturated Pool Boiling Apparatus
10.	Performance Of Different Heat Pipe Apparatus
11.	Heat Transfer Rate Through Heat Exchanger Apparatus
12.	Heat Transfer Coefficient In Forced Convection of Air in a Tube Apparatus
13.	Heat transfer through composite wall Apparatus
14.	Thermal conductivity of insulating slab Apparatus
15.	HeattransferthroughlaggedpipeApparatus
16.	UnsteadystateheattransferApparatus
17.	TestingandperformanceTestRigforheatinsulators

Course Outcomes:	
On successful completion of the course, the student will be able to:	
1.	Demonstrate conduction,convection and radiation heat transfer through experiments.
2.	Determine thermal conductivity and temperature distribution in different system.
3.	Determine heat transfer coefficient of different system.
4.	Determine emissivity and Stefen-Boltsman constant of radiation.
5.	Analyze the performance characteristics of heat transfer equipments.

ChhattisgarhSwamiVivekanandTechnicalUniversity,Bhilai	
Name of program:**Bachelor of Technology**	
Branch: **Mechanical Engineering**	Semester:**VI**
Subject: **Virtual Lab2**	Code: **C037624(037)**
Total Lab Periods:**48**	Batch Size–**30**
Maximum Marks**: 40**	Minimum Marks:**20**

Courseobjective:

The objective of this course is to inculcate a habit of self learning in our students through virtual lab. Virtual Labs isa project initiated by the Ministry of Human Resource Development, Government of India, under the National Mission on Education through Information and Communication Technology. Virtual lab provides remote experimentation which furnishes basic leaning skill, and built advanced concepts as well. It provide complete Learning Management System around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self evaluation.

ListofExperiments

Sl.	Name of Virtual Lab	Website link	
A.	**Remote Triggered Virtual Lab on Automotive Systems**	**http://vlabs.iitkgp.ac.in/rtvlas/**	**(Any03)**
	1. PV Diagram of a SI Engine 2. Torque Crank Angle Curve of a SI Engine 3. Load Test on a SI Engine 4. Mechanical Efficiency of a SI Engine 5. Determination of Cylinder Mean Effective Pressure 6. Engine Health Monitoring by Vibration Analysis 7. Variation of Exhaust Noise with Engine Speed 8. Tensional Vibrations of an Engine		
B.	**Machine Dynamics and Mechanical Vibrations Lab**	**http://mdmv-nitk.vlabs.ac.in/#**	**(Any02)**
	1. Free vibration of cantilever beam 2. Free vibration of simply supported beam 3. Free vibration of fixed beam 4. Forced vibration of SDOF system 5. Base Excitation 6. Rotating Unbalance 7. 2D OF Forced vibration 8. Dynamic Vibration Absorber		

C.	**Rotating Machinery Fault Simulation Lab**	**http://vlabs.iitkgp.ac.in/rmfs/**	**(Any02)**
	1. Diagnosis of Shaft Misalignment and its Effects 2. Static Balancing Studies of Rotary Systems 3. Mechanical Looseness 4. Bearing Defects of Various Types 5. Effects of Bent Shafts on Rotor Performance 6. Cavitation of Centrifugal Pump		
D	**Fabrication Laboratory (FABLAB)**	http://fab-coep.vlabs.ac.in/	**(Any02)**
	1. Computer Controlled Cutting of wooden object 2. 3D Machining 3. PCB design & fabrication 4. Interface & Application Programming 5. Digital Fabrication of Flexible Circuit board 6. Digital Fabrication and Project Development		
E.	**Metal forming virtual simulation Lab**	**http://msvs-dei.vlabs.ac.in/msvs-dei/**	**-**
	Study of metal forming processes ,equipments and applications.		

Equipment/Machines/Instruments/Tools/Software Required:	
1.	Computer system with good connectivity to Internet, any specific software is not required.

Note:	
1.	Refer Virtual Labs website which is an initiative of ministry of education under the national mission on Education through ICT to conduct virtual lab .Link: https://www.vlab.co.in/
2.	It is advised to visit https://www.vlab.co.in/broad-area-mechanical-engineering frequently for any update And new experiments on the listed subjects.

Course Outcomes:	
On successful completion of the course, the student will be able to:	
1.	Analyze auto motive systems.
2.	Analyze vibration through virtual simulator.
3.	Analyze rotating machinery fault
4.	Describe digital fabrication after learning the process through fabrication laboratory
5.	Describe metal forming processes ,equipments and applications.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Program / Semester: **B.Tech (VI)**	Branch: **Humanities**
Subject: **Technical Communication & Soft Skills**	Course Code: **C000601(046)**
Total Marks (Internal Assessment): 10	L: 0 T:0 P: 2 Credit(s): 0
Internal Assessments to be conducted: 02	Duration (End Semester Exam): **NA**

UNIT-1 Communication Skills-Basics: Understanding the communicative environment, Verbal Communication; Non Verbal Communication & Cross Cultural Communication, Body Language & Listening Skills; Employment Communication&writing CVs, Cover Letters for correspondence.Common errors during communication, Humour in Communication.

UNIT-2 Interpersonal communication: Presentation, Interaction and Feedbacks, Stage Manners, Group Discussions (GDs) and facing Personal Interviews, Building Relationships, Understanding Group Dynamics- I, Emotional and Social Skills, Groups, Conflicts and their Resolution, Social Network, Media and Extending Our Identities.

UNIT- 3 Vocational skills: Managing time: Planning and Goalsetting, managing stress: Types of Stress; Making best out of Stress, Resilience, Work-life balance, Applying soft-skills to workplace.

UNIT-4 Mindsets and Handling People: Definitions and types of Mindset, Learning Mindset, Developing Growth Mindset, Types of People, How to Lead a Meeting, How to Speak Effectively in Meetings, Behavior & Roles in Meetings, Role Play: Meeting.On Saying "Please", How to say "NO".

UNIT-5Positive Pschycology: Motivating oneself, Persuasion, Survival Strategies, Negotiation, Leadership and motivating others**,** controlling anger**,** Gaining Power from Positive Thinking.

Text Books:

1. Petes S. J., Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw-Hill Education, 2011.
2. Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success. Canada: Wiley & Sons, 2006.
3. Dorch, Patricia. What Are Soft Skills? New York: Execu Dress Publisher, 2013.

Reference Books:

- Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams, and Leaders. Washington, DC: Pfeiffer & Company, 2013.
- Peale Norman Vincent. The Power of Positive Thinking: 10 Traits for Maximum Result. Paperback Publication. 2011.
- Klaus, Peggy, Jane Rohman& Molly Hamaker. The Hard Truth about Soft Skills. London: Harper Collins E-books, 2007.

Course Outcomes

1. Learn to listen actively to analyse audience and tailor the delivery accordingly.
2. Increase their awareness of communication behaviour by using propriety-profiling tool.
3. Master three "As" of stressful situation: Avoid, Alter, Accept; to cope with stressors and create a plan to reduce or eliminate them.
4. Develop growth mind-set and able to handle difficult person and situations successfully.
5. Develop technique of turning negativity into positivity and generate self-motivation skills.