Department of Mechanical Engineering
VBS Purvanchal University, Jaunpur

STUDY&EVALUATIONSCHEMEWITHSYLLABUS

FOR

B.TECH.2ndYEAR

MECHANICALENGINEERING

[EffectivefromSession:2019-20]

B.Tech. (MechanicalEngineering)

SEMESTER-III

Sl. No.	Subject Codes	Subject	Periods			EvaluationScheme			EndSemester			Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KOE031-38/ KAS302	Engg.ScienceCourse/MathsIV	3	1	0	30	20	50		100		150	4
2	KAS301/ KVE301	Technical Communication/UniversalHumanValues	2	1	0	30	20	50		100		150	3
			3	0	0								
3	KME301	Thermodynamics	3	1	0	30	20	50		100		150	4
4	KME302	FluidMechanics& Fluid Machines	3	1	0	30	20	50		100		150	4
5	KME303	MaterialsEngineering	3	0	0	30	20	50		100		150	3
6	KME351	FluidMechanicsLab	0	0	2				25		25	50	1
7	KME352	MaterialTestingLab	0	0	2				25		25	50	1
8	KME353	ComputerAidedMachine Drawing-ILab	0	0	2				25		25	50	1
9	KME354	MiniProjector Internship Assessment*	0	0	2			50				50	1
10	KNC301/ KNC302	ComputerSystemSecurity/Python Programming	2	0	0	15	10	25		50			0
11		MOOCs(Essential forHons. Degree)											
		Total										950	22

*TheMiniProjectorinternship(3-4weeks)conducted duringsummerbreakafterIIsemesterandwillbeassessedduringIIIsemester.

Sl. No.	Subject Codes	Subject	Periods			EvaluationScheme			EndSemester			Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KAS402/ KOE041-48	MathsIV/Engg.Science Course	3	1	0	30	20	50		100		150	4
2	KVE401/ KAS401	UniversalHuman Values/Technical Communication	3	0	0	30	20	50		100		150	3
			2	1	0								
3	KME401	AppliedThermodynamics	3	0	0	30	20	50		100		150	3
4	KME402	EngineeringMechanics	3	1	0	30	20	50		100		150	4
5	KME403	ManufacturingProcesses	3	1	0	30	20	50		100		150	4
6	KME451	AppliedThermodynamics Lab	0	0	2				25		25	50	1
7	KME452	ManufacturingProcessesLab	0	0	2				25		25	50	1
8	KME453	Computer AidedMachine Drawing-IILab	0	0	2				25		25	50	1
9	KNC402/ KNC401	Python Programming /ComputerSystemSecurity	2	0	0	15	10	25		50			0
10		MOOCs(Essentialfor Hons. Degree)											
		Total										900	21

SEMESTER-III
THERMODYNAMICS

L-T-P
3-1-0

Objectives:

- Tolearnaboutworkandheatinteractions,andbalanceofenergybetweensystemanditssurroundings.
- Tolearn aboutapplication ofIlawtovariousenergyconversion devices.
- Toevaluate the changesin propertiesofsubstances in various processes.
- Tounderstandthedifferencebetweenhighgradeandlow-gradeenergiesandIIlawlimitationson energyconversion.

UNIT I
ReviewofFundamental Conceptsand Definitions:
Introduction- Basic Concepts: System, ControlVolume, Surrounding, Boundaries, Universe, Types ofSystems,MacroscopicandMicroscopicviewpoints,ConceptofContinuum,ThermodynamicEquilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle Reversibility Quasi – staticProcess, Irreversible Process, Causes of Irreversibility Energy and its forms, Work and heat (signconvention), Gas laws, Ideal gas, Real gas, Law of corresponding states, Property of mixture of gases,electrical,magnetic,gravitational, springand shaftwork.
Zerothlaw of thermodynamics: ConceptofTemperatureandits'measurement,Temperaturescales.
Firstlawofthermodynamics:
First Law for Flow Processes - Derivation of general energy equation for a control volume;Steady statesteadyflowprocessesincludingthrottling;Examplesofsteadyflowdevices;Unsteadyprocesses;exampl es of steady and unsteady I law applications for system andcontrol volume. Limitations of firstlaw of thermodynamics, PMM-I. Steady flow systems and their analysis, Steady flow energy equation,Boilers, Condensers, Turbine,Throttlingprocess,Pumps etc.

UNIT II
Secondlawofthermodynamics:
Thermal reservoirs, Energy conversion, Heat engines, Efficiency, Reversed heat engine, Heat pump,Refrigerator, Coefficient of Performance, Kelvin Planck and Clausius statement of second law ofthermodynamics, Equivalence of the two statements. Reversible and irreversible processes, Carnotcycle and Carnot engine, Carnot theorem and it's corollaries, Thermodynamic Temperature Scale,PMM-II.
Entropy: Clausius inequality, Concept of Entropy, Entropy change of pure substance in differentthermodynamic processes, Tds equation, Principle of entropy increase, T-S diagram, Statement of thethirdlaw ofthermodynamics.

UNIT III
AvailabilityandIrreversibility:
Availableandunavailable energy,AvailabilityandIrreversibility,Second lawefficiency,Helmholtz&Gibb's function.
Thermodynamicrelations:
Conditionsforexactdifferentials.Maxwellrelations,Clapeyronequation,Joule-
ThompsoncoefficientandInversioncurve.Coefficientofvolumeexpansion, AdiabaticandIsothermal compressibility.

UNIT IV
PropertiesofsteamandRankinecycle:
Pure substance, Property of Pure Substance (steam), Triple point, Critical point, Saturation states, Sub-cooledliquidstate,Superheatedvapourstate,Phasetransformationprocessofwater,Graphicalrepresentation ofpressure,volumeandtemperature,P-T,P-VandP-hdiagrams,T-SandH-Sdiagrams, use of property diagram, Steam-Tables &Moller chart, Dryness factor and it's measurement,processesinvolvingsteam in closed and open systems. SimpleRankine cycle.
Air-watervapourmixtureandPsychrometry:Psychometrictermsandtheirdefinitions,Psychometric chart,Different PsychometricprocessesandtheirrepresentationonPsychometric chart.

UNIT V
RefrigerationCycles:
ReversedCarnotCycleforgasandvapour.Refrigerationcapacity,unitofrefrigeration.AirRefrigerationcycle s;ReversedBraytonCycleandBellColemanCycle.Vapourcompressionrefrigeration cycle; simple saturated cycle and actual vapour compression refrigeration cycle. Analysisof cycles, effect of superheating, sub-cooling and change in evaporator and condenser pressure onperformance of vapour compression refrigeration cycle. Refrigerants; their classification and desirableproperties.Vapour absorption refrigeration system.

CourseOutcomes:
- Aftercompletingthiscourse,thestudentswillbeabletoapplyenergybalancetosystemsandcontrol volumes, in situationsinvolvingheatandworkinteractions.
- Students canevaluatechangesinthermodynamicpropertiesofsubstances.
- Thestudentswillbeable to evaluatethe performanceof energyconversiondevices.
- Thestudentswill beabletodifferentiatebetween highgradeandlow-gradeenergies.

BooksandReferences:
1. BasicandAppliedThermodynamics byPKNag, MCGRAW HILLINDIA.
2. Thermodynamicsfor Engineers byKroos&Potter,Cengage Learning.

3. Thermodynamics byShavitandGutfinger,CRC Press.
4. Thermodynamics-AnEngineeringApproachbyCengel,MCGRAW HILLINDIA.
5. BasicEngineeringThermodynamics,Joel,Pearson.
6. Fundamentalsof EngineeringThermodynamics byRathakrishnan, PHI.
7. EngineeringThermodynamicsbyDhar,Elsevier.
8. EngineeringThermodynamicsbyOnkarSingh,NewAgeInternational.
9. EngineeringThermodynamicsbyCPArora.
10. EngineeringThermodynamics byRogers, Pearson.
11. FundamentalsofEngineeringThermodynamicsbyMoran,Shapiro,Boettner,&Bailey,JohnWiley.
12. EngineeringThermodynamicsbyMishra,CengageLearning.
13. RefrigerationandAirConditioningbyCP Arora,MCGRAWHILLINDIA.

FLUIDMECHANICS AND FLUIDMACHINES

L-T-P
3-1-0

Objectives:
- Tolearn about theapplication of mass andmomentum conservation lawsfor fluid flows.
- To understand the importanceof dimensional analysis.
- Toobtain thevelocityandpressure variationsin varioustypesof simple flows.
- Toanalyzethe flowinwaterpumpsandturbines.

UNIT-I
Definition of fluid, Newton's law of viscosity, Units and dimensions-Properties of fluids,mass density,specific volume, specific gravity, viscosity, compressibility and surfacetension, Incompressible flow,Bernoulli's equation and its applications - Pitot tube, orifice meter, venturi meter and bend meter,notchesand weirs, momentum equation and itsapplication topipe bends.

UNIT-II
Continuum & free molecular flows. Steady and unsteady, uniform and non-uniform, laminar andturbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic,sonicandsupersonicflows,sub-critical,criticalandsupercriticalflows,one,two-andthree-
dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream functionandvelocitypotential.Buckingham'sPitheorem,importantdimensionlessnumbersandtheirsignific ance.

UNIT-III
Equation of motion for laminar flow through pipes, turbulent flow, isotropic, homogenous turbulence,scale and intensity of turbulence, measurement of turbulence, eddy viscosity, resistance to flow, minorlosses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, threereservoirproblems and pipe networks.
Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application ofmomentum equation, turbulent boundary layer, laminar sublayer, separation and its control, Drag andlift,dragonasphere,atwo-dimensional cylinder,and anaerofoil,Magnuseffect.

UNIT-IV
Introduction to hydrodynamic thrust of jet on a fixed and moving surface, Classification of turbines,Impulseturbines,Constructionaldetails,Velocitytriangles,Powerandefficiencycalculations,Gove rningofPelton wheel.
FrancisandKaplanturbines,Constructionaldetails,Velocitytriangles,PowerandefficiencyPrinciplesofsimi larity,Unitandspecificspeed,Performancecharacteristics,Selectionofwaterturbines.

UNIT-V
Classificationsofcentrifugalpumps,Vectordiagram,Workdonebyimpellor,Efficienciesofcentrifugalpump s, Specific speed, Cavitation&separation, Performancecharacteristics.
Reciprocating pump theory, Slip, Indicator diagram, Effect of acceleration, air vessels, Comparison ofcentrifugaland reciprocatingpumps, Performancecharacteristics.

CourseOutcomes:
- Upon completion of this course, students will be able to mathematically analyze simple flowsituations.
- Theywill be abletoevaluate theperformanceofpumps and turbines.

BooksandReferences:
1. Introductiontofluidmechanics andFluidmachinesbyS.KSom,Gautam Biswas,SChakraborty.
2. FluidmechanicsandmachinesbyR.K Bansal.
3. F.M.White,FluidMechanics, 6thEd.,TataMcGraw-Hill, 2008.
4. FluidMechanicsandIts ApplicationsbyV.K.Gupta et.al.
5. FluidMechanicsbyYunusCengel.
6. Batchelor, G. K. (1999). Introduction to fluid dynamics. New Delhi, India: Cambridge UniversityPress.
7. Acheson,D.J.(1990). Elementaryfluiddynamics.New York,USA:OxfordUniversityPress.
8. R.W. Fox,A.T.McDonald andP.J.Pritchard,IntroductiontoFluid Mechanics,6thEd., JohnWiley,2004

MATERIALSENGINEERING

Objective:
- Understanding of the correlation between the internal structure of materials, theirmechanicalpropertiesand various methodsto quantifytheirmechanical integrityandfailurecriteria.
- Toprovideadetailedinterpretationof equilibrium phasediagrams.
- Learningaboutdifferent phasesand heattreatmentmethods totailorthe propertiesof Fe-Calloys.

UNIT-I

Crystal Structure: Unit cells, Metallic crystal structures, Ceramics. Imperfection in solids:Point, line,interfacialandvolumedefects;dislocationstrengtheningmechanismsandslipsystems,criticallyresolved shear stress.

Mechanical Property measurement: Tensile, compression and torsion tests; Young'smodulus, relationsbetween true and engineering stress-strain curves, generalized Hooke'slaw, yielding and yield strength,ductility, resilience, toughness and elastic recovery;Hardness: Rockwell, Brinell and Vickers and theirrelationtostrength.

UNIT-II

Static failure theories: Ductile and brittle failure mechanisms, Tresca, Von-mises, Maximumnormalstress,Mohr-CoulombandModifiedMohr-
Coulomb;Fracturemechanics:IntroductiontoStress-intensity factor approach and Griffith criterion. Fatigue failure: Highcycle fatigue, Stress-life approach,SN curve, endurance and fatigue limits, effects of meanstress using the Modified Goodman diagram;Fracturewithfatigue,Introduction to non-destructivetesting(NDT).

UNIT-III

Alloys, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binaryphasediagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions.IronIron-
carbidephasediagramandmicrostructuralaspectsofledeburite,austenite,ferriteandcementite,castiron.

UNIT-IV

HeattreatmentofSteel:Annealing,tempering,normalisingandspheroidising,isothermaltransformationdiag ramsforFe-
Calloysandmicrostructuredevelopment.Continuouscoolingcurvesandinterpretationoffinalmicrostructure sandproperties-austempering,martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flameandinductionhardening,vacuumand plasma hardening.

UNIT-V

Alloying of steel, properties of stainless steel and tool steels, maraging steels- cast irons;grey, white,malleableandspheroidalcastirons-copperandcopperalloys;brass,bronzeandcupro-nickel;Aluminiumand Al-Cu – Mg alloys- Nickelbasedsuperalloys and Titaniumalloys.

CourseOutcomes:
- Student will be able to identify crystal structures for various materials and understandthedefectsinsuchstructures.
- Understandhowtotailormaterialpropertiesofferrousandnon-ferrousalloys.
- How to quantifymechanicalintegrityand failurein materials.

BooksandReferences:
1. W. D. Callister, 2006, "Materials Science and Engineering-An Introduction", 6th Edition,WileyIndia.
2. Kenneth G. Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall ofIndiaPrivateLimited, 4thIndian Reprint,2002.
3. V. Raghavan, "Material Science and Engineering', Prentice Hall of India Private Limited,1999.
4. Mechanics of materials byJames M.Gere.
5. IntroductiontoengineeringmaterialsbyB.K.Agarwal.
6. Physicalmetallurgyandadvanced materials byR.E.Smallman.
7. Engineeringmechanics ofcomposite materialsbyIsaacM.Daniel.
8. U.C.Jindal,"EngineeringMaterialsandMetallurgy",Pearson,2011.

FLUIDMECHANICSLAB

Objectives:
- Tounderstandtheprinciplesandperformancecharacteristicsofflowandthermal devices.
- Toknow aboutthemeasurementofthefluid properties.

Listof Experiments:(Atleast8ofthe following)

1. To determinethecoefficient of impactfor vanes.

2. To determinecoefficient of discharge ofan orificemeter.

3. To determinethecoefficient of discharge ofNotch (Vand Rectangulartypes).

4. Todeterminethe friction factorfor thepipes.

5. Todeterminethecoefficient of discharge ofventuri meter.

6. To determinethecoefficient ofdischarge, contraction &velocityof anorifice.

7. To verifytheBernoulli'sTheorem.

8. TofindcriticalReynoldsnumber fora pipeflow.

9. Todeterminethemeta-centricheightof a floatingbody.

10. Todeterminethe minor losses duetosuddenenlargement, suddencontraction and bends.

11. To show the velocityand pressurevariationwith radius in a forced vertexflow.

CourseOutcomes:
The students who have undergone the course will be able to measure various properties offluids andcharacterizethe performanceof fluid/thermal machinery.

MATERIALTESTINGLAB

L-T-P
0-0-2

Objectives:

- Tounderstandtheprinciplesand performancecharacteristicsdifferent materials.
- Toknowabout material properties.

ListofExperiments:(At least8 ofthefollowing)

1. Strength testofagivenmildsteelspecimenonUTMwithfulldetails andstressversusstrain plotonthemachine.
2. Othertests such asshear, bend tests on UTM.
3. Impactteston impacttestingmachinelikeCharpy,Izod orboth.
4. HardnesstestofgivenspecimenusingRockwelland Vickers/Brinelltestingmachines.
5. Springindextestonspringtestingmachine.
6. Fatiguetestonfatiguetestingmachine.
7. Creeptest on creeptestingmachine.
8. Experimentondeflectionofbeam,comparisonofactualmeasurementofdeflectionwithdialgaugetothe calculated one,andorevaluation ofyoung'smodulus of beam.
9. Torsion testof arod usingtorsion testingmachine.
10. StudyofNDT(non-destructivetesting)methodslikemagneticflawdetector,ultrasonicflawdetector,eddycurrent testingmachine,dyepenetranttests.

CourseOutcomes:
Thestudentswhohave undergonethe coursewillbeable tomeasure variousproperties ofmaterials.

COMPUTERAIDED MACHINEDRAWING-ILAB

L-T-P
0-0-2

Objectives:
Toprovidean overview ofhow computers canbeutilizedin mechanicalcomponent design.

UNIT-I

Introduction (1drawingsheets)
Introduction, classification of machine drawings, principles of drawing, conventional representation ofmachinecomponentsandmaterials,lines,typesoflines,dimensioningtypes,linesandrulesofdimensioning.

Orthographic Projections(3 drawingsheets)
Introduction to orthographic projection, concept of first angle and third angle projection, drawing ofsimple machine elements in first angle projection, missing line problems, principle of visualization ofobjects,sectionalviews,full and half sectionalviews, auxiliaryviews.

UNIT-II

Fasteners(2 drawingsheets)
Temporaryandpermanentfasteners,threadnomenclatureandforms,threadseries,designation,representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation boltsetc.,keys,typesof keys,cotterand knuckle joints.

UNIT-III

Rivetedjoints(1 drawingsheet)
Introduction,rivetsand riveting,typesofrivets, typesof rivetedjoints,drawingofboiler jointsetc.

Freehand sketching(1 drawingsheet**)**
Introduction,Needforfreehandsketching,Freehandsketchingoffoundationbolts,studs,pulleys,couplingsetc.

UNIT-IV

Assembly drawing(2drawingsheets)
Introductiontoassemblydrawing,drawingassemblydrawing
ofsimplemachineelementslikerigidorflexiblecoupling, muffcoupling, Plummerblock, footstep bearing, bracketetc.

UNIT-V

Computeraideddrafting(1drawing**)**
Introduction to computer aided drafting; advantages and applications of CAD, concepts of computeraided 2D drafting using any drafting software like AutoCAD, Solid Edge, Draft Sight etc., basic drawandmodifycommands,making2D drawings of simplemachine parts.

CourseOutcomes:
Uponcompletionofthiscourse,thestudentscanusecomputerandCADsoftware
formodellingmechanicalcomponents.

BooksandReferences:
1. Fundamentalsof Machine DrawingbySadhuSingh&Shah, PHI.
2. EngineeringDrawing byBhat,&Panchal, Charotar PublishingHouse.
3. MachineDrawingwith AutoCADbyPohit andGhosh, Pearson.
4. MachineDrawing-KLNarayana,PKannaiah,KVReddy,NewAge.
5. MachineDrawing,N.Siddeshswar,PKannaiah,VVS Shastry,TataMcGrawHill.
6. EngineeringDrawing,Pathak,Wiley.
7. TextbookofMachineDrawing,KCJohn,PHI.
8. AutoCAD2014forEngineers&Designers,Bhatt, WILEY

SEMESTER-IV
APPLIEDTHERMODYNAMICS

Objectives: **L-T-P**
                                                                                      3-0-0

- Tolearnabout ofIlaw forreactingsystems andheatingvalueoffuels.
- Tolearnaboutgasand vaporcyclesandtheirfirstlawandsecondlaw efficiencies.
- Tounderstand abouttheproperties ofdryandwet air andthe principlesof psychrometry.
- Tolearn aboutgas dynamicsof airflow andsteam throughnozzles.
- Tolearntheaboutreciprocatingcompressorswithandwithoutintercooling.
- Toanalyze the performance ofsteamturbines.

UNIT I
Introduction to solid, liquid and gaseous fuels– Stoichiometry, exhaust gas analysis- First lawanalysisofcombustionreactions-Heatcalculationsusingenthalpytables-Adiabaticflametemperature-Chemicalequilibrium andequilibriumcomposition calculationsusing freeenergy.
IntroductionandOtto,Diesel andDualcycles.

UNIT II
Vapour Powercycles:
Vapor power cycles Rankine cycle with superheat, reheat and regeneration, exergy analysis. Rankinecycle, effect of pressure and temperature on Rankine cycle, Reheat cycle, Regenerative cycle, Feedwaterheaters,Binaryvapour cycle, Combinedcycles, Cogeneration.
Fuels and Combustion: Combustion analysis, heating values, air requirement, Air/Fuel ratio, standardheat of reaction and effect of temperature on standard heat of reaction, heat of formation, Adiabaticflametemperature.

UNIT III
Boilers: Classifications and working of boilers, boiler mountings and accessories, Draught and itscalculations, air pre-heater, feed water heater, super heater. Boiler efficiency, Equivalent evaporation.Boiler trialand heatbalance.
Condenser: Classification ofcondenser,airleakage, condenserperformanceparameters.

UNIT IV
Steam and Gas Nozzles: Flow through Convergent and convergent-divergent nozzles, variation ofvelocity,areaandspecificvolume,chokedflow,throatarea,Nozzleefficiency,Offdesignoperationof nozzle, Shock waves stationary normal shock waves, Effect of friction on nozzle, Super saturatedflow.
Steam Turbines: Classification of steam turbine, Impulse and Reaction turbines, Staging, Stage andOverall efficiency, reheat factor, Bleeding, Velocity diagram of simple and compound multistageimpulse and reaction turbines and related calculations, work done, efficiencies of reaction, Impulsereaction turbines, state point locus, Losses in steam turbines, Governing of turbines, Comparison withsteam engine.

UNIT V
Gas Turbine: Gas turbine classification, Brayton cycle, Principles of gas turbine, Gas turbine cycleswithintercooling,reheatandregenerationandtheircombinations,Stageefficiency,Polytropicefficiency.Deviation ofactual cycles from idealcycles.

JetPropulsion: Introductiontotheprinciplesofjetpropulsion,Turbojetandturbopropenginesandtheirprocesses, Principle of rocketpropulsion,Introduction to RocketEngine.
Reciprocatingcompressors,stagingofreciprocatingcompressors,optimalstagepressureratio,effectofintercooling,minimumwork for multistagereciprocating compressors.

CourseOutcomes:
- Aftercompletingthiscourse,thestudentswillgetagoodunderstandingofvariouspracticalpowercycle s and heat pump cycles.
- Theywillbeabletoanalyzeenergyconversioninvariousthermaldevicessuchascombustors,aircooler s, nozzles, diffusers, steamturbines andreciprocating compressors.
- Theywill be abletounderstand phenomena occurringinhigh speedcompressible flows.

BooksandReferences:
1. Basicand AppliedThermodynamics byP.K.Nag, mcgrawhill india.
2. AppliedthermodynamicsbyOnkarSingh,New AgeInternational.
3. AppliedThermodynamicsforEngineeringTechnologistsbyEastop,PearsonEducation.
4. AppliedThermodynamicsbyVenkannaAndSwati,PHI.
5. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals ofThermodynamics, John Wileyand Sons.
6. Jones,J.B. andDuggan, R.E., 1996,EngineeringThermodynamics,Prentice-Hall ofIndia
7. Moran,M.J. andShapiro,H. N.,1999,Fundamentals ofEngineeringThermodynamics,JohnWileyand Sons.
8. TheoryofStreamTurbinebyWJKearton.

ENGINEERINGMECHANICS

L–T–P
3-1-0

Objectives:

To develop capacity to predict the effect of force and motion in the course of carrying out the designfunctionsofengineering.

UNIT-I:
Two-dimensional force systems: Basic concepts, Laws of motion, Principle of transmissibility offorces, transfer of a force to parallel position, resultant of a force system, simplest resultant of twodimensional concurrent and non-concurrent force systems, distribution of force systems, free bodydiagrams,equilibrium and equations ofequilibrium.
Friction: Friction force–Lawsof sliding friction – equilibriumanalysis of simplesystemswithslidingfriction – wedge friction.

UNIT-II:
Beam: Introduction, shear force and bending moment, different equations of equilibrium, shear forceandbendingmomentdiagram for staticallydetermined beams.
Trusses: Introduction, simple truss and solution of simple truss, methods of F-joint and methods ofsections.

UNIT-III:
Centroid and moment of inertia: Centroid of plane, curve, area, volume and composite bodies,moment of inertiaof plane area, parallel axistheorem, perpendicular axis theorem, principle momentof inertia, mass moment of inertia of circular ring, disc, cylinder, sphere, and cone about their axis ofsymmetry.

UNIT-IV:
Kinematics of rigid body: Introduction, plane motion of rigid body, velocity and acceleration undertranslationaland rotationalmotion, relative velocity.
Kinetics of rigid body: Introduction, force, mass and acceleration, work and energy, impulse andmomentum,D'Alembert's principle and dynamicequilibrium.

UNIT-V:
Simple stress and strain: Introduction, normal and shear stresses, stress-strain diagrams for ductileand brittle material, elastic constants, one-dimensional loading of members of varying cross sections,strainenergy.
Pure bending of beams: Introduction, simple bending theory, stress in beams of different crosssections.
Torsion: Introduction, torsion of shafts of circular cross sections, torque and twist, shear stress due totorque.

CourseOutcomes:
After completing this course, the students should be able to understand the various effect of force andmotionon theengineeringdesign structures.

BooksandReferences:

1. Beer,F.PandJohnstonJr.E.R.,"VectorMechanicsforEngineers(InSIUnits):StaticsandDynamics",8thEdition, Tata McGraw-HillPublishingcompany,NewDelhi (2004).

2. VelaMurali,"EngineeringMechanics", OxfordUniversityPress(2010).

3. ATextbook ofEngineeringMechanics,R.K. Bansal,LaxmiPublications.

4. EngineeringMechanics, R.S.Khurmi, S.ChandPublishing.

5. MeriamJ.L.andKraigeL.G.,"EngineeringMechanics-Statics-Volume1,Dynamics-Volume2",Third Edition, JohnWiley& Sons (1993).

6. RajasekaranSandSankarasubramanianG.,"EngineeringMechanicsStaticsandDynamics",3rdEdition,Vikas PublishingHousePvt.Ltd., (2005).

7. Bhavikatti,S.SandRajashekarappa,K.G.,"EngineeringMechanics",NewAgeInternational(P)LimitedPublishers, (1998).

8. Engineeringmechanics byIrving H.Shames, Prentice-Hall.

MANUFACTURING PROCESSES

L-T-P
3-1-0

Objectives:

To motivate and challenge students to understand and develop an appreciation of theprocesses incorrelation with material properties which change the shape, size and form of theraw materials into thedesirableproductbyconventional or unconventional manufacturingmethods.

UNIT-I
ConventionalManufacturing processes:
Castingandmoulding:Metalcastingprocessesandequipment,Heattransferandsolidification,shrinkage, riser design,casting defects and residual stresses.Introduction to bulk and sheet metalforming, plastic deformation and yield criteria;fundamentals of hot and cold working processes; loadestimation for bulk forming (forging,rolling, extrusion, drawing) and sheet forming (shearing, deepdrawing,bending) principlesofpowdermetallurgy.

UNIT-II
Metal cutting:
Single and multi-point cutting; Orthogonal cutting, various force components:Chipformation, Tool wear and tool life, Surface finish and integrity, Machinability, cutting tool materials,cuttingfluids,Coating;Turning,Drilling,Millingandfinishingprocesses,IntroductiontoCNCmac hining.Additive manufacturing: Rapid prototyping and rapid toolingJoining/fastening processes:Physicsofwelding,brazingandsoldering;designconsiderationsinwelding,Solidandliquidstatejoi ningprocesses;Adhesive bonding.

UNIT-III
Grinding & Superfinishing:
Grinding: Grinding wheels, abrasive & bonds, cutting action. Grinding wheel specification. Grindingwheelwear- attritionswear,fracturewear. Dressing and Truing. Max chip thickness andGuestcriteria.Surfaceand cylindrical grinding. Centreless grinding.
Superfinishing: Honing, lappingand polishing.

UNIT-IV
MetalJoining (Welding):
Survey of welding and allied processes. Gas welding and cutting, process and equipment. Arc welding:Power sources and consumables. TIG & MIG processes and their parameters. Resistance welding -spot,seamprojectionetc.Otherweldingprocessessuchasatomichydrogen,submergedarc,electroslag,frictio n welding. Soldering& Brazing. Adhesivebonding. Weld decayin HAZ.

UNIT-V
Unconventional MachiningProcesses:
Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, UltrasonicMachining,principlesandprocessparameters.ElectricalDischargeMachining,principleandproc essesparameters, MRR, surface finish,tool wear, dielectric, power and control circuits, wire EDM; Electro-chemical machining(ECM), etchant &maskant,process parameters, MRR and surface finish.LaserBeamMachining(LBM), Plasma ArcMachining (PAM)and Electron BeamMachining.

CourseOutcomes:

Upon completion of this course, students will be able to understand the different conventionalandunconventionalmanufacturingmethods employed for makingdifferent products.

BooksandReferences:

1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)-PearsonIndia, 2014.
2. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, andSystems.
3. ManufacturingTechnologybyP.N. Rao., MCGRAWHILLINDIA.
4. Materialsand ManufacturingbyPaulDegarmo.
5. ManufacturingProcesses byKaushish, PHI.
6. PrinciplesofFoundryTechnology, Jain,MCGRAWHILLINDIA
7. Production TechnologybyRK Jain.
8. Degarmo,Black &Kohser,MaterialsandProcessesin Manufacturing.

APPLIEDTHERMODYNAMICSLAB

Objectives:
Tounderstandtheprinciples andperformanceofvariousboilersandengines.

ListofExperiments:(At least8 ofthefollowing)

1. StudyofFire Tubeboiler.
2. StudyofWaterTubeboiler.
3. StudyandworkingofTwostrokepetrolEngine.
4. Studyand workingofFourstrokepetrolEngine.
5. DeterminationofIndicatedH.P.ofI.C. EnginebyMorseTest.
6. PreparetheheatbalancesheetforDieselEnginetestrig.
7. Prepareheatbalancesheet forPetrolEnginetestrig.
8. StudyandworkingoftwostrokeDieselEngine.
9. Studyand workingoffour stroke Diesel Engine.
10. StudyofVelocitycompoundedsteamturbine.
11. StudyofPressurecompoundedsteamturbine.
12. Studyof Impulse &Reaction turbine.
13. Studyofsteam Enginemodel.
14. StudyofGasTurbineModel.

CourseOutcomes:
Thestudentwho have undergonethe course willbeable to identifyvariousproperties of system.

MANUFACTURINGPROCESSLAB

L-T-P
0-0-2

Objectives:
To motivate and challenge students to understand and develop an appreciation of the processes incorrelationwithmaterialpropertieswhichchangetheshape,sizeandformoftherawmaterialsintothe desirable productbyconventional or unconventionalmanufacturingmethods.

ListofExperiments:(At least8ofthe followingalong-with studyofthemachines/processes)

1. Shear-angledetermination (usingformula) withtubecutting(fororthogonal) onlathe machine.
2. Bolt(thread) makingonLathemachine.
3. Toolgrinding(to provide toolangles)on tool-grinder machine.
4. Gearcuttingon Millingmachine.
5. Machining ablockonshapermachine.
6. Finishingof asurfaceonsurface-grindingmachine.
7. Drillingholes ondrillingmachineand studyoftwist-drill.
8. Studyofdifferent typesof toolsand itsangles&materials.
9. Experimentontoolwear andtoollife.
10. Experimentonjigs/Fixtures anditsuses.
11. Gasweldingexperiment.
12. Arcweldingexperiment.
13. Resistanceweldingexperiment.
14. Soldering&Brazingexperiment.
15. Studyand understandingof limits, fits&tolerances.
16. Studyoftemperaturemeasuringequipment's.
17. MeasurementusingStrain gauge.
18. Experimentondynamometers.
19. Tostudythe displacementusingLVDT.

CourseOutcomes:
Upon completion of this course, students will be able to understand the different conventional andunconventionalmanufacturingmethods employed for makingdifferent products.

COMPUTERAIDED MACHINEDRAWING-IILAB

L-T-P
0-0-2

Objectives:

Toprovidean overview ofhow computers canbeutilizedin mechanicalcomponent design.

Note:AlldrawingconformstoBISCodes.

Introduction: Conventionalrepresentationofmachinecomponentsandmaterials,Conventionalrepresentation of surface finish, Roughness number symbol, Symbols of Machine elements and weldedjoints. Classification of Drawings: Machine drawings, Production drawing, part drawing and assemblydrawing.Introduction todetail drawingandbillofmaterials (BOM).

Limits, Fits and Tolerances: General aspects, Nominal size and basic dimensions, Definitions, Basisoffitorlimitsystem,Systemsofspecifyingtolerances,Designationofholes,Shaftsandfits,Commonlyusedholes and shafts.List of StandardAbbreviation used.

Part Modelling: Introduction to part modelling of simple machine components using any 3D software(like CATIA, PRO E, UGNX, Autodesk Inventor or SOLIDWORKS) covering all commands/ featurestodevelop a partmodel *(Minimum 24machine components needtobedeveloped).*

PartModelling&Assembliesof: PlummerBlockBearing,MachineVice,ScrewJack,EngineStuffingbox,LatheTailstock, FeedCheckValveand Rams Bottom SafetyValve.

CourseOutcomes:
Upon completion of this course, the students can use computer and CAD software formodellingmechanicalcomponents.

BooksandReferences:
1. TextbookofMachineDrawing,KCJohn,PHI.
2. MachineDrawingbyK.R.Gopalakrishna, Subhas Stores.
3. A Textbook ofMachineDrawingbyPSGillfromS.K. Kataria&Sons.
4. MachineDrawing-KLNarayana,PKannaiah,KVReddy, NewAgepublications.
5. EngineeringGraphics withAutoCAD,Bethune,PHI.
6. MachineDrawing,N.Siddeshswar,PKannaiah,VVS Shastry,TataMcGrawHill.
7. FundamentalsofMachineDrawing,DrSadhuSingh&PLShah,Prantice HallIndia.

8. AutodeskInventorbyExamples, SamTikoo,Wiley.

EngineeringScienceCoursesforB.Tech.(AICTEModelCurriculum) 2ndYear

(effectivefromthesession2021-22)

Sl.No.	Subject Codes	Subject	Periods			EvaluationScheme			EndSemester			Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KOE031/041	EngineeringMechanics	3	1	0	30	20	50		100		150	4
2	KOE032/042	MaterialScience	3	1	0	30	20	50		100		150	4
3	KOE033/043	EnergyScience&Engineering	3	1	0	30	20	50		100		150	4
4	KOE034/044	Sensor&Instrumentation	3	1	0	30	20	50		100		150	4
5	KOE035/045	BasicsData Structure& Algorithms	3	1	0	30	20	50		100		150	4
6	KOE036/046	IntroductiontoSoftComputing	3	1	0	30	20	50		100		150	4
7	KOE037/047	AnalogElectronicsCircuits	3	1	0	30	20	50		100		150	4
8	KOE038/048	Electronics Engineering	3	1	0	30	20	50		100		150	4
	KOE039/049	DigitalElectronics	3	1	0	30	20	50		100		150	4

Sl.No.	Subject	
1	EngineeringMechanics	TobeofferedtoanyEngg.BranchexceptME/CE/AGandalliedbranches
2	MaterialScience	
3	EnergyScience&Engineering	To beofferedto anyEngg.Branchexcept EEandalliedbranches
4	Sensor&Instrumentation	
5	BasicsData Structure& Algorithms	To beoffered toanyEngg.BranchexceptCSE andalliedbranches
6	IntroductiontoSoftComputing	
7	AnalogElectronicsCircuits	To beoffered to anyEngg.BranchexceptECandallied branches
8	Electronics Engineering	
9	DigitalElectronics	To be offered to any Engg. Branch except EC, EE and allied branches

ImportantNote: CH/BT/TXEngg.andalliedbranchescanbeofferedanyofthe abovelistedES.

ENGINEERINGMECHANICS

UNIT-I:
Two-dimensionalforce systems: Basicconcepts,Lawsof motion,Principleoftransmissibility offorces,transfer of aforceto parallelposition, resultantof aforce system,simplestresultantof two dimensionalconcurrent and non-concurrent forcesystems,distribution of forcesystems, freebody diagrams, equilibriumandequationsof equilibrium.
Friction: Friction force–Lawsofslidingfriction–equilibriumanalysisofsimplesystemswithslidingfriction–wedgefriction.

UNIT-II:
Beam: Introduction,shear forceandbending moment,differentequationsofequilibrium,shear forceandbending momentdiagramforstaticallydeterminedbeams.
Trusses: Introduction,simpletrussandsolutionofsimpletruss,methodsofF-jointandmethodsofsections.

UNIT-III:
Centroid and moment of inertia: Centroid of plane, curve, area, volume and composite bodies, moment ofinertia of plane area, parallel axis theorem, perpendicular axis theorem, principle moment of inertia, massmomentofinertiaofcircularring,disc,cylinder,sphere,andconeabouttheiraxisofsymmetry.

UNIT-IV:
Kinematicsofrigidbody: Introduction,planemotionofrigidbody,velocityandaccelerationundertranslationalandrotational motion,relativevelocity.
Kinetics of rigid body: Introduction, force, mass and acceleration, work and energy, impulse and momentum,D'Alembert'sprincipleanddynamicequilibrium.

UNIT-V:
Simplestressandstrain: Introduction,normalandshearstresses,stress-straindiagramsforductileandbrittlematerial,elasticconstants,one-dimensionalloadingofmembersofvaryingcrosssections,strainenergy.
Purebendingofbeams: Introduction,simplebendingtheory,stressinbeamsofdifferentcrosssections.
Torsion: Introduction,torsionofshaftsofcircularcrosssections,torqueandtwist,shearstressduetotorque.

BooksandReferences:

1. Beer,F.PandJohnstonJr.E.R.,"VectorMechanicsforEngineers(InSIUnits):StaticsandDynamics",8thEdition,Tata McGraw-HillPublishingcompany,NewDelhi(2004).
2. VelaMurali,"EngineeringMechanics",OxfordUniversityPress(2010).
3. ATextbookofEngineeringMechanics,R.K.Bansal,LaxmiPublications.
4. EngineeringMechanics,R.S.Khurmi,S.ChandPublishing.
5. MeriamJ.L.andKraigeL.G.,"EngineeringMechanics-Statics-Volume1,Dynamics-Volume2",ThirdEdition,JohnWiley&Sons(1993).
6. RajasekaranSandSankarasubramanianG.,"EngineeringMechanicsStaticsandDynamics",3rdEdition,VikasPublishingHouse Pvt.Ltd.,(2005).
7. Bhavikatti,S.Sand Rajashekarappa,K.G., "EngineeringMechanics", NewAgeInternational(P)LimitedPublishers,(1998).
8. EngineeringmechanicsbyIrvingH.Shames,Prentice-Hall.

MATERIALSCIENCE

UNIT-I:
PhaseDiagrams:
Solidsolutions–HumeRothery'srules–thephaserule–singlecomponentsystem–one-componentsystemof iron – binary phase diagrams – isomorphous systems – the tie-line rule – the lever rule – application toisomorphous system – eutectic phase diagram– peritecticphasediagram– other invariant reactions – freeenergycompositioncurvesforbinarysystems–microstructuralchangeduringcooling.

UNIT-II:
FerrousAlloys:
The iron-carbon equilibrium diagram – phases, invariant reactions – microstructure of slowly cooled steels – eutectoid steel, hypo and hypereutectoid steels – effect of alloying elements on the Fe-C system – diffusion insolids–Fick'slaws–phasetransformations–T-T-T-diagramforeutectoidsteel–
pearlitic,bainticandmartensitictransformations–temperingofmartensite–steels–stainlesssteels–castirons.

UNIT-III:
MechanicalProperties:
Tensiletest–plasticdeformationmechanisms–slipandtwinning–roleofdislocationsinslip–strengthening methods–strainhardening–refinementofthegrainsize–solidsolutionstrengthening–precipitation hardening – creep resistance – creep curves – mechanisms of creep – creep-resistant materials –fracture – the Griffith criterion – critical stress intensity factor and its determination – fatigue failure – fatiguetests – methods of increasing fatigue life – hardness – Rockwell and Brinell hardness – Knoop and Vickersmicrohardness.

UNIT-IV:
Magnetic,Dielectric&SuperconductingMaterials:
Ferromagnetism – domain theory – types of energy – hysteresis – hard and soft magnetic materials – ferrites – dielectric materials – types of polarization – Langevin-Debye equation – frequency effects on polarization – dielectric breakdown – insulating materials – Ferroelectric materials – superconducting materials and theirproperties.

UNIT-V:
NewMaterials:
Ceramics –types andapplications –composites: classification,roleofmatrixandreinforcement, processingof fiber reinforced plastics – metallic glasses: types , glass forming ability of alloys, melt spinning process,applications–shapememoryalloys:phases,shapememoryeffect,pseudoelasticeffect,NiTialloy,applications – nanomaterials: preparation (bottom up and top down approaches), properties and applications –carbonnanotubes:types.

TextBooks&References:

1. Balasubramanian,R.―Callister'sMaterialsScienceandEngineering‖.WileyIndiaPvt.Ltd.,2014.
2. Raghavan,V.―PhysicalMetallurgy:PrinciplesandPractice‖.PHILearning,2015.
3. Raghavan,V.―MaterialsScienceandEngineering:AFirstcourse‖.PHILearning,2015.
4. Askeland,D.―MaterialsScienceandEngineering‖.Brooks/Cole,2010.

5. Smith, W.F., Hashemi, J. & Prakash, R. ―Materials Science and Engineering‖. Tata McGraw Hill Education Pvt. Ltd., 2014.
6. Wahab, M.A. ―Solid State Physics: Structure and Properties of Materials‖. Narosa Publishing House, 2009.

EnergyScienceandEngineering

Unit-I Energy and its Usage: Units and scales of energy use, Mechanical energy and transport,Heat energy: Conversion between heat and mechanical energy, Electromagnetic energy: Storage,conversion, transmission and radiation, Introduction to the quantum, energy quantization, Energyin chemical systems and processes, flow of CO2, Entropy and temperature, carnot and Stirlingheat engines, Phase change energy conversion, refrigeration and heat pumps, Internal combustionengines,Steamandgaspowercycles,thephysicsofpowerplants.Solid-statephenomenaincludingphoto,thermalandelectricalaspects

Unit-II Nuclear Energy: Fundamental forces in the universe, Quantum mechanics relevant fornuclear physics, Nuclear forces, energy scales and structure, Nuclear binding energy systematics,reactions and decays, Nuclear fusion, Nuclear fission and fission reactor physics, Nuclear fissionreactordesign,safety,operationandfuelcycles

Unit-III Solar Energy: Introduction to solar energy, fundamentals of solar radiation and itsmeasurementaspects,Basicphysicsofsemiconductors,Carriertransport,generationandrecombination in semiconductors, Semiconductor junctions: metal-semiconductor junction & p-njunction, Essential characteristics of solar photovoltaic devices, First Generation Solar Cells,SecondGenerationSolarCells,ThirdGenerationSolarCells

Unit-IVConventional&non-conventionalenergysource: Biological energy sources andfossil fuels, Fluid dynamics and power in the wind, available resources, fluids, viscosity, types offluid flow, lift, Wind turbine dynamics and design, wind farms, Geothermal power and oceanthermalenergyconversion,Tidal/wave/hydropower

Unit-V Systems and Synthesis: Overview of World Energy Scenario, Nuclear radiation, fuelcycles,wasteandproliferation,Climatechange,Energystorage,Energyconservation.Engineering for Energy conservation: Concept of Green Building and Green Architecture; Greenbuilding concepts, LEED ratings; Identification of energy related enterprises that represent thebreath of the industry and prioritizing these as candidates; Embodied energy analysis and use as atoolformeasuringsustainability.EnergyAuditofFacilitiesandoptimizationofenergyconsumption

Reference/TextBooks

1. EnergyandtheChallengeofSustainability,WorldEnergyAssessment,UNDP,NewYork,(2000).
2. PerspectiveofModernPhysics,A.Beiser,McGraw-HillInternationalEditions(1968).
3. IntroductiontoModernPhysics,H.S.Maniand G.K.Mehta,East-WestPress(1988).
4. IntroductiontoElectrodynamics,D.J.Griffiths,FourthEdition,PrenticeHall(2013).
5. IntroductoryNuclearPhysics,R.K.PuriandV.K.Babbar,NarosaPublishingHouse(1996).
6. PhysicsofSolarCells:FromBasicPrinciplestoAdvancedConceptsbyPeterWurfel,JohnWiley &Sons,2016
7. PrinciplesofSolarEngineering,D.Y.Goswami,F.KreithandJ.F.Kreider,TaylorandFrancis,Philadelphia,2000.

SENSOR AND INSTRUMENTATION

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:	Knowledge Level, KL
Upon the completion of the course, the student will be able to:	
CO 1 Apply the use of sensors for measurement of displacement, force and pressure.	K_3
CO2 Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.	K_3
CO3 Demonstrate the use of virtual instrumentation in automation industries.	K_2
CO4 Identify and use data acquisition methods.	K_3
CO5 Comprehend intelligent instrumentation in industrial automation.	K_2

Detailed Syllabus:

Unit-I:
Sensors & Transducer: Definition, Classification & selection of sensors, Measurement of displacement using Potentiometer, LVDT & Optical Encoder, Measurement of force using strain gauge, Measurement of pressure using LVDT based diaphragm & piezoelectric sensor.

Unit-II:
Measurement of temperature using Thermistor, Thermocouple & RTD, Concept of thermal imaging, Measurement of position using Hall effect sensors, Proximity sensors: Inductive & Capacitive, Use of proximity sensor as accelerometer and vibration sensor, Flow Sensors: Ultrasonic & Laser, Level Sensors: Ultrasonic & Capacitive.

Unit -III:
Virtual Instrumentation: Graphical programming techniques, Data types, Advantage of Virtual Instrumentation techniques, Concept of WHILE & FOR loops, Arrays, Clusters & graphs,
Structures: Case, Sequence & Formula nodes, Need of software based instruments for industrial automation.

Unit-IV:
Data Acquisition Methods: Basic block diagram, Analog and Digital IO, Counters, Timers, Types of ADC: successive approximation and sigma-delta, Types of DAC: Weighted Resistor and R-2R Ladder type, Use of Data Sockets for Networked Communication.

Unit V:
Intelligent Sensors: General Structure of smart sensors & its components, Characteristic of smart sensors: Self calibration, Self-testing & self-communicating, Application of smart sensors: Automatic robot control & automobile engine control.

TextBooks:

1. DVSMurthy,TransducersandInstrumentation,PHI2ndEdition2013
2. DPatranabis,Sensorsand Transducers, PHI2nd Edition2013.
3. S.Gupta,J.P.Gupta/PCinterfacingforDataAcquisition&ProcessControl,2ndED/InstrumentSocietyofAmerica,1994.
4. GaryJohnson/ LabVIEWGraphical ProgramingIIEdition/McGrawHill1997.

ReferenceBooks:

1. ArunK.Ghosh,IntroductiontomeasurementsandInstrumentation,PHI,4th Edition2012.
2. A.D.HelfrickandW.D.cooper,ModernElectronic Instrumentation&MeasurementTechniques,PHI– 2001
3. HermannK.P. Neubert,"InstrumentTransducers"2ndEdition2012,OxfordUniversityPress.

BasicsDataStructureandAlgorithms

	CourseOutcome(CO)	Bloom'sKnowledgeLevel(KL)
	Attheendofcourse,thestudentwillbeabletounderstand	
CO1	Understandandanalyzethetimeandspacecomplexityofan algorithm	K_2, K_4
CO2	Understand and implement fundamental algorithms (includingsortingalgorithms,graphalgorithms,anddynamicprogr amming)	K_2, K_3
CO3	Discussvariousalgorithmdesigntechniquesfordevelopingalgorit hms	K_1, K_2
CO4	Discuss various searching, sorting and graph traversal algorithms	K_2, K_3
CO5	UnderstandoperationonQueue,PriorityQueue,D-Queue.	K_2

K_1-Remember,K_2-Understand,K_3-Apply,K_4-Analyze,K_5-Evaluate,K6-Create

BasicsDataStructureandAlgorithms		
DetailedSyllabus		
Unit	**Topic**	**Proposed Lecture**
I	**IntroductiontodatastructureandAlgorithms:**PerformanceanalysisofAlgorithm,timecomplexity, Big-oh notation, Elementary data organization data structure operations, Recurrences,Arrays,Operationonarrays,representationofarraysinmemory,singledimensionaland multidimensionalarrays,sparematrices,CharacterstoringinC,Stringoperations.	08
II	**Stack And Queue and Link List:** Stack operation, PUSH and POP, Array representation of stacks,OperationassociatedwithstacksApplicationofstacks,Recursion,Polishexperession,Representatio nQueue,operationonQueue,PriorityQueue,D-Queue,Singlyandcircularly linkedlist,ListoperationsListsimplementations	08
III	**Trees:**Basicterminology,BinaryTrees,Binarytreerepresentation,Algebraic/expressions,CompleteBinar yTrees,Extendedbinarytree,representingbinarytressinmemory,linkedrepresentationofBinarytrees,Trav ersingbinarytrees&Searchinginbinarytrees,Insertingin binarysearchtrees,Complexityofsearchingalgorithm,Heaps,generaltrees,Threadedbinarytree.	08
IV	**Graphs:**Terminology&representations,Graphs&Multigraphs,DirectedGraphs,Sequentialrepresentatio n of graphs, adjacency Matrices, Transversal, connected component and spanning trees,Minimum Costspanningtree,Primsand KruskalAlgorithm,BFS,DFS,Shortestpathandtransitive closure,Activitynetworks,topologicalsortandcriticalpaths.	08
V	**SearchingandSorting:**Linearsearch,binarySearch,InternalandExternalsorting,Bubblesorting,selection sort, Insertion sort, quick sort, Two way merge sort, Heap sort, sorting on different keys,practicalconsiderationforinternalsorting,ExternalSorting,StorageDevices:Magnetictapes,DiskStora ge,SortingwithdisksandIndexingtechniques,introductiontoB treeandB+tree,File organizationandstoragemanagement,Introductiontohoisting.	08

Textbooks:

1. ThomasH.Coreman,CharlesE.LeisersonandRonaldL.Rivest,IntroductiontoAlgorithms,PHI.
2. HorowitzandSahani,"FundamentalsofDataStructures",GalgotiaPublication.
3. Weiss,"DataStructure&AlgorithmAnalysisinC",AddisionWesley.
4. Basse,"computerAlgorithms:IntroductiontoDesign&Analysis",AddisionWesley.
5. Lipschutz,"Datastructure,"Schaumseries.
6. Aho,hopcropt,Ullman,"DataStructure&Algorithm",AddisionWesley.
7. Aho,Hopcraft,Ullman,"TheDesignandAnalysisofComputerAlgorithms"PearsonEducation,2008

IntroductiontoSoftComputing

	CourseOutcome(CO)	Bloom'sKnowledgeLevel(KL)
	Attheendofcourse,thestudentwillbeabletounderstand	
CO1	Comprehendthefuzzylogicandtheconceptoffuzziness involvedinvarioussystemsandfuzzysettheory.	K_1,K_2
CO2	Understand the concepts of fuzzy sets, knowledge representationusingfuzzyrules,approximatereasoning,fuzzyinfer encesystems,andfuzzylogic	K_2,K_3
CO3	Describewithgeneticalgorithmsandotherrandomsearchprocedur esusefulwhileseekingglobaloptimuminself-learningsituations.	K_4
CO4	Understand appropriate learning rules for each of the architecturesandlearnseveralneuralnetworkparadigmsandits applications.	K_2,K_3
CO5	Developsomefamiliaritywithcurrentresearchproblemsand researchmethodsinSoftComputingTechniques.	K_5,K_6

K_1-Remember,K_2-Understand,K_3-Apply,K_4-Analyze,K_5-Evaluate,K6-Create

	IntroductiontoSoftComputing	
	DetailedSyllabus	
Unit	**Topic**	**Proposed Lecture**
I	IntroductiontoSoftComputing, **ARTIFICIALNEURALNETWORKS** Basicconcepts-Singlelayerperception-MultilayerPerception-SupervisedandUnsupervised learning–Backpropagationnetworks-Kohnen'sself-organizingnetworks-Hopfieldnetwork.	08
II	**FUZZYSYSTEMS** Fuzzysets,FuzzyRelationsandFuzzyreasoning,Fuzzyfunctions-Decomposition- Fuzzyautomata andlanguages- Fuzzycontrolmethods-Fuzzydecisionmaking.	08
III	**NEURO-FUZZYMODELING** AdaptivenetworksbasedFuzzyinterfacesystems-ClassificationandRegressionTrees-Dataclustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulatedannealing–Evolutionarycomputation	08
IV	**GENETICALGORITHMS** SurvivaloftheFittest-FitnessComputations-Crossover-Mutation-Reproduction-Rankmethod -Rankspacemethod.	08
V	**APPLICATIONOFSOFTCOMPUTING** OptimiationoftravelingsalesmanproblemusingGeneticAlgorithm,Geneticalgorithmbased InternetSearchTechniques,Softcomputingbasedhybridfuzzycontroller,IntroductiontoMATLABEnvironment for Soft computingTechniques.	08

Textbooks:

1. AnIntroductiontoGeneticAlgorithmMelanicMitchell(MITPress)
2. EvolutionaryAlgorithmforSolvingMulti-objective,OptimizationProblems(2ndEdition),Collelo,Lament,Veldhnizer(Springer)
3. FuzzyLogicwithEngineeringApplicationsTimothyJ.Ross(Wiley)4.N
   eural Networks and Learning Machines Simon Haykin
   (PHI)5.Sivanandam,Deepa," PrinciplesofSoftComputing",Wiley

6.JangJ.S.R,SunC.T.andMizutaniE,"Neuro-FuzzyandSoftcomputing",PrenticeHall7.Timothy J.
Ross, "Fuzzy Logic with Engineering Applications", McGraw
Hill8.LaureneFausett,"Fundamentalsof NeuralNetworks",PrenticeHall
9.D.E.Goldberg,"GeneticAlgorithms:Search,OptimizationandMachineLearning",AddisonWesley10.Wang,
"FuzzyLogic",Springer

	AnalogElectronicsCircuits	3L:1T:0P	4Credits

Unit	Topics	Lectures
I	Diodecircuits,amplifiermodels:Voltageamplifier,currentamplifier,trans-conductanceamplifierandtrans-resistanceamplifier.biasingschemes for BJT and FET amplifiers, bias stability, various configurations(such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis,lowfrequencytransistormodels,estimationofvoltagegain,inputresistance,outputresistanceetc.,designprocedureforparticular specifications,lowfrequencyanalysisofmultistageamplifiers.	8
II	High frequency transistor models, frequency response of single stage andmultistageamplifiers,cascodeamplifier,variousclassesofoperation(ClassA, B,AB,Cetc.),theirpowerefficiencyandlinearityissues,feedback topologies: Voltage series, current series, voltage shunt, currentshunt,effectoffeedbackongain,bandwidthetc.,calculationwithpractical circuits,conceptofstability,gainmarginandphasemargin.	8
III	Oscillators:Reviewofthebasicconcept,Barkhausencriterion,RCoscillators(phase shift,Wienbridgeetc.),LCoscillators(Hartley,Colpitt, Clappetc.),non-sinusoidaloscillators.	8
IV	Current mirror: Basic topology and its variants, V-I characteristics, outputresistanceandminimumsustainablevoltage(VON),maximumusableload,differentialamplifier:Basicstructureandprincipleofoperation,calculation ofdifferential gain,common modegain,CMRRand ICMR,Op-Ampdesign:Designofdifferentialamplifierforagivenspecification, designofgainstagesandoutputstages,compensation.	8
V	Op-Ampapplications:Reviewofinvertingandnon-invertingamplifiers,integratoranddifferentiator,summingamplifier,precisionrectifier,Schmitttriggeranditsapplications,activefilters:Lowpass,highpass, bandpassandbandstop,designguidelines.	8

Text/ReferenceBooks:
1. J.V.Wait,L.P.HuelsmanandGAKorn,"IntroductiontoOperationalAmplifiertheoryandapplications,"McGrawHill,1992.
2. J.MillmanandA.Grabel,"Microelectronics,"2ndedition,McGrawHill,1988.
3. P.HorowitzandW.Hill,"TheArtofElectronics,"2ndedition,CambridgeUniversityPress,1989.
4. A.S.SedraandK.C.Smith,"MicroelectronicCircuits,"Saunder'sCollege11Publishing,4thedition.
5. PaulR.GrayandRobertG.Meyer,"AnalysisandDesignofAnalogIntegratedCircuits,"JohnWiley, 3rdedition.
6. MuhammadH.Rashid,"ElectronicDevicesandCircuits,"Cengagepublication,2014.

CourseOutcomes:
Attheendofthiscoursestudentswilldemonstratetheabilityto:
1. Understandthecharacteristicsofdiodesandtransistors.
2. Designandanalyzevariousrectifierandamplifiercircuits.
3. Designsinusoidalandnon-sinusoidaloscillators.
4. UnderstandthefunctioningofOP-AMPanddesignOP-AMPbasedcircuits.
5. DesignLPF,HPF,BPF,BSF.

	Electronics Engineering	3L:1T:0P	4Credits

Unit	Topics	Lectures
I	PN junction diode: Introduction of semiconductor materials; Semiconductor diode: Depletion layer, V-I characteristics, ideal and practical, diode resistance, capacitance, diode equivalent circuits, transition and diffusion capacitance, Zener diodes breakdown mechanism (Zener and avalanche).	8
II	Diode application: Series, parallel and series, parallel diode configuration, half and full wave rectification, clippers, clampers, Zener diode as shunt regulator, voltage-multiplier circuits special purpose two terminal devices :light-emitting diodes, Varactor (Varicap) diodes, tunnel diodes, liquid-crystal displays.	8
III	Bipolar junction transistors and field effect transistor: Bipolar junction transistor: Transistor construction, operation, amplification action, common base, common emitter, common collector configuration dc biasing BJTs: operating point, fixed-bias, emitter bias, voltage-divider bias configuration. Collector feedback, emitter-follower configuration. Bias stabilization. CE, CB, CC amplifiers and AC analysis of single stage CE amplifier (re Model), Field effect transistor: Construction and characteristic of JFETs. AC analysis of CS amplifier, MOSFET (depletion and enhancement) type, transfer characteristic.	8
IV	Operational amplifiers: Introduction and block diagram of Op-Amp, ideal & practical characteristics of Op-Amp, differential amplifier circuits, practical Op-Amp circuits (inverting amplifier, non-inverting amplifier, unity gain amplifier, summing amplifier, integrator, differentiator), Op-Amp parameters: input offset voltage, output offset voltage, input biased current, input offset current differential and common-mode operation.	8
V	Electronic instrumentation and measurements: Digital voltmeter: Introduction, RAMP techniques digital multimeters: Introduction Oscilloscope: introduction, basic principle, CRT, block diagram of oscilloscope, simple, measurement of voltage, current phase and frequency using CRO, introduction of digital storage oscilloscope and comparison of DSO with analog oscilloscope.	8

Text/Reference Books:
1. Robert L. Boylestand/Louis Nashelsky, "Electronic Devices and Circuit Theory," Latest Edition, Pearson Education.
2. HS Kalsi, "Electronic Instrumentation", Latest Edition, TMH Publication.
3. Meetidehran/ A.K. singh "fundamental of electronics Engineering", New age international publisher.

Course Outcomes:
At the end of this course students will demonstrate the ability to:
1. Understand the concept of PN junction and special purpose diodes.
2. Study the application of conventional diode and semiconductor diode.
3. Analyse the I-V characteristics of BJT and FET.
4. Analyze the of Op-Amp, amplifiers, integrator, and differentiator.
5. Understand the concept of digital storage oscilloscope and compare of DSO with analog oscilloscope

DIGITAL ELECTRONICS KOE039/KOE049

Course Outcomes: Knowledge Level, KL

Upon the completion of the course, the student will be able to:

CO 1   Apply concepts of Digital Binary System and implementation of Gates.
                                                                                    K3

CO2   Analyze and design of Combinational logic circuits.   K4

CO3   Analyze and design of Sequential logic circuits with their applications.
                                                                                    K4

CO4   Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits.
                                                                                    K3

CO5   Apply the concept of Digital Logic Families with circuit implementation.
                                                                                    K3

KL-Bloom'sKnowledgeLevel($K_1, K_2, K_3, K_4, K_5, K_6$)
K_1–RememberK_2– Understand K_3–ApplyK_4– AnalyzeK_5– EvaluateK_6– Create

UNITI

Digital System And Binary Numbers: Number System and its arithmetic Signed binary numbers, Logic simplification and combinational logic design: Binary codes, code conversion, review of Boolean algebra and Demorgans theorem, SOP & POS forms, Canonical forms, Karnaugh maps method up to five variable, Don't care conditions, POS simplification, NAND and NOR implementation, Quine McClusky method (Tabular method).

UNITII

Combinational Logic: MSI devices like Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders. Multiplexed display, half and full adders, subtractors, serial and parallel adders, BCD adder

UNITIII

Sequential Logic And Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.

UNITIV

Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of
Asynchronous sequential circuits, circuit with latches, Design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.

UNITV

Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL & CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA and PAL

TextBooks:

1. M.MorrisManoandM.D.Ciletti,"DigitalDesign",PearsonEducation.

2. DigitalCircuitsandDesign,S.Salivahanan,OxfordUniversityPress
3. DavidJ.Comer,"DigitalLogic&StateMachineDesign",OxfordUniversityPress.
4. RPJain,"ModernDigitalElectronics",McGrawHillPublication.
5. A.AnandKumar, "FundamentalofDigital Circuits,"PHI4th edition,2018.
6. D.V.Hall,"DigitalCircuitsandSystems,"McGrawHill,1989.

TechnicalCommunication(KAS301/401)
(Effectivefromthesession2019-20)

Unit-1FundamentalsofTechnical Communication

L T P210
TechnicalCommunication:Features;DistinctionbetweenGeneralandTechnicalCommunication;Language asatoolofCommunication;DimensionsofCommunication:Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition,types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal;BarrierstoCommunication.

Unit-IIForms ofTechnicalCommunication:
Technical Report: Definition & importance;Thesis/Project writing: structure& importance;synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar &Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Csofeffectivebusinesswriting:concreteness,completeness,clarity,conciseness,courtesy,correctness ,consideration,C.V./Resumewriting;TechnicalProposal:Types,Structure &Draft.

Unit-IIITechnicalPresentation:Strategies& Techniques
Presentation:Forms;interpersonalCommunication;Classroompresentation;style;method;Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance;emotion;Humour;ModesofPresentation;OvercomingStageFear;AudienceAnalysis&retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; AudienceParticipation:Quizzes&Interjections.

Unit-IVTechnical CommunicationSkills:
Interview skills; GroupDiscussion: Objective & Method; Seminar/ConferencesPresentationskills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis;Criticalthinking;Nuances:Expositionnarration&Description;effectivebusinesscommunication competence: Grammatical; Discourse competence: combination of expression &conclusion;Socio-linguisticcompetence:Strategiccompetence:Solutionofcommunicationproblemswithverbalandnon verbalmeans.

Unit-VDimensionsofOralCommunication&VoiceDynamics:
Code and Content; Stimulus & Response; Encoding process; Decoding process; PronunciationEtiquette; Syllables; Vowel sounds; Consonant sounds; Tone: Rising tone; Falling Tone; Flow inSpeaking; Speaking with a purpose; Speech & personality; Professional Personality Attributes:Empathy;Considerateness;Leadership;Competence.

ReferenceBooks

1. TechnicalCommunication–PrinciplesandPracticesbyMeenakshiRaman &SangeetaSharma,OxfordUniv.Press,2007,NewDelhi.
2. PersonalityDevelopmentand SoftSkillsbyBarunK. Mitra,OUP, 2012, NewDelhi.
3. SpokenEnglish-

AManualofSpeechandPhoneticsbyR.K.Bansal&J.B.Harrison,OrientBlackswan,2013,NewDelhi.

4. BusinessCorrespondenceandReport WritingbyProf.R.C.Sharma&KrishnaMohan,TataMcGrawHill&Co.Ltd.,2001,NewDelhi.

5. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S.PublicationsIndiaLtd.;KrishanNagar,2014,Delhi.

6. ModernTechnicalWritingbySherman,TheodoreA(et.al);ApprenticeHall;NewJersey;U.S.

7. ATextBookofScientificandTechnicalWritingbyS.D.Sharma;VikasPublication,Delhi.

8. SkillsforEffective BusinessCommunicationbyMichaelMurphy,HarwardUniversity,U.S.

9. Business Communication forManagersbyPayalMehra, PearsonPublication,Delhi.

CourseOutcomes

1. Students willbeenabledto

   understandthenatureandobjectiveofTechnicalCommunicationrelevantf

   ortheworkplaceasEngineers.

2. Studentswill**utilize**thetechnicalwritingforthepurposesofTechnicalCommunicationa

   nditsexposureinvariousdimensions.

3. Students

   wouldimbibeinputsbypresentationskillsto**enhance**confidenceinfaceofdiverseaud

   ience.

4. Technicalcommunicationskillswill**create**avastknow-

   howoftheapplicationofthelearningtopromotetheirtechnicalcompetence.

5. Itwouldenablethemto**evaluate**theirefficacyasfluent&efficientcommunicatorsbyle

   arningthevoice-dynamics.

	L	**T**	**P**	**C**
KVE401 **UniversalHuman Valuesand ProfessionalEthics**	3	0	0	3

Objectives:

1. Tohelpstudentsdistinguishbetweenvaluesandskills,andunderstandtheneed,basic guidelines, contentand processofvalueeducation.
2. Tohelpstudentsinitiateaprocessofdialogwithinthemselvestoknowwhatthey're allywant to be'intheir lifeand profession
3. Tohelpstudentsunderstandthemeaningofhappinessandprosperityforahumanbeing.
4. Tofacilitatethestudentstounderstandharmonyatallthelevelsofhumanliving,and live accordingly.
5. Tofacilitatethestudentsinapplyingtheunderstandingofharmonyinexistencein their profession and leadan ethicallife

CourseOutcome:

Oncompletionofthiscourse,thestudentswillbeableto

1. Understandthesignificanceofvalueinputsinaclassroom,distinguishbetween values and skills, understand the need, basic guidelines, content andprocess of value education, explore the meaning of happiness and prosperityanddoacorrectappraisal of thecurrentscenarioin thesociety
2. DistinguishbetweentheSelfandtheBody,understandthemeaningofHarmonyin theSelftheCo-existenceofSelfand Body.
3. Understand the value of harmonious relationship based on trust, respect andothernaturallyacceptablefeelingsinhuman-humanrelationshipsandexploretheirrolein ensuringaharmonious society
4. Understandtheharmonyinnatureandexistence,andworkouttheirmutuallyfulfill ingparticipationin thenature.
5. Distinguish between ethical and unethical practices, and start working outthestrategytoactualize aharmoniousenvironmentwherevertheywork.

CatalogueDescription

Every human being has two sets of questions to answer for his life: a) what todo? and, b) how to do?. The first set pertains to the value domain, and the otherto the skill domain. Both are complimentary, but value domain has a higherpriority. Today, education has become more and more skill biased, and hence,thebasicaspirationofahumanbeing,thatistolivewithhappinessandprosperity, getsdefeated,inspiteofabundanttechnologicalprogress.Thiscourse is aimed at giving inputs that will help to ensure the right understandingand right feelings in the students in their life and profession, enabling them toleadanethicallife.Inthiscourse,thestudentslearntheprocessofself-exploration,the difference between the Self and the Body, thenaturally acceptablefeelingsinrelationships ina family,the comprehensivehuman goal in

the society, themutual fulfillment in the nature and the co-existence in existence. As a natural outcome of such inputs, they are able toevaluate anethicallifeandprofession ahead.

UNIT-1   **CourseIntroduction-**
Need,BasicGuidelines,ContentandProcessfor ValueEducation
Understanding the need, basic guidelines, content and process for Value
Education,Self-Exploration–what is it? - its content and process; 'Natural
Acceptance'   andExperientialValidation-
asthemechanismforselfexploration,ContinuousHappinessandProsperity-
AlookatbasicHumanAspirations,Rightunderstanding,RelationshipandPhysicalFacili
ties-
thebasicrequirementsforfulfillmentofaspirationsofeveryhumanbeingwiththeircorrect
priority,UnderstandingHappinessandProsperitycorrectly-
Acriticalappraisalofthecurrent scenario, Method to fulfillthe above human
aspirations: understanding andlivingin harmonyat various levels.

UNIT-2   **UnderstandingHarmonyintheHumanBeing-HarmonyinMyself**
Understanding human being as a co-existence of the sentient 'I' and the
material'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and
Suvidha,Understanding the Body as an instrument of 'I' (I being the doer, seer and
enjoyer),Understandingthecharacteristicsandactivitiesof'I'andharmonyin'I',Underst
anding the harmony of I with the Body: Sanyam and Swasthya;
correctappraisalofPhysicalneeds,meaningofProsperityin detail,   Programs
                                                                              to
ensureSanyamand Swasthya.

UNIT-3   **Understanding Harmony in the Family and Society- Harmony**
inHuman-HumanRelationship
UnderstandingharmonyintheFamily-
thebasicunitofhumaninteraction,Understandingvaluesinhuman-
humanrelationship;meaningof*Nyaya*andprogram for its fulfillment to ensure
Ubhay-tripti; Trust (*Vishwas*) and Respect(*Samman*) as the foundational values of
relationship,   Understanding   the   meaning
of*Vishwas*;Differencebetweenintentionandcompetence,Understandingthemeaning
of*Samman*,Differencebetween respect anddifferentiation; the othersalient values in
relationship,   Understanding   the   harmony   in   the   society
(societybeinganextensionoffamily):*Samadhan*,*Samridhi*,*Abhay*,*Sah-
astitva*ascomprehensive Human Goals, Visualizing a universal harmonious order in
society-UndividedSociety(*AkhandSamaj*),UniversalOrder(*SarvabhaumVyawastha*)-
fromfamilyto world family!.

UNIT-4   **Understanding Harmony in the Nature and Existence -**
Wholeexistenceas Co-existence
UnderstandingtheharmonyintheNature,Interconnectednessandmutualfulfillment
among   the   four   orders   of   nature-   recyclability   and   self-regulation
innature,UnderstandingExistenceasCo-existence(*Sah-astitva*)ofmutuallyinteracting
units in all-pervasive space, Holistic perception of harmony at all levelsof
existence.

UNIT-5   **Implications of the above Holistic Understanding of Harmony**
onProfessionalEthics
Natural   acceptance   of   human   values,   Definitiveness   of   EthicalHuman
Conduct,BasisforHumanisticEducation,HumanisticConstitutionandHumanisticUniv
ersalOrder,CompetenceinProfessionalEthics:a)Abilitytoutilizetheprofessional
competence   for   augmenting   universal   human   order,
b)Abilitytoidentifythescopeandcharacteristicsofpeople-friendlyandeco-friendly

production systems, technologies and management models, Case studies of typicalholistic technologies, management models and production systems, Strategy fortransition from the present state to Universal Human Order: a) At the level ofindividual: as socially and ecologically responsible engineers, technologists andmanagers,b)Atthelevelofsociety:asmutuallyenrichinginstitutionsandorganizations.

TextBooks:

1. RR Gaur,R Sangal,G PBagaria, 2009,AFoundationCoursein HumanValuesand Professional Ethics.

References:

1. IvanIllich, 1974, Energy & Equity, The Trinity Press, Worcester, andHarperCollins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as ifpeople mattered, Blond &Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W.Behrens III, 1972, Limits to Growth – Club of Rome's report, UniverseBooks.
5. ANagraj,1998,JeevanVidyaEkParichay,DivyaPathSansthan,Amarkantak.
6. PLDhar,RRGaur,1990,ScienceandHumanism,CommonwealthPublishers.
7. ANTripathy,2003,HumanValues,NewAgeInternationalPublishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik)KrishiTantraShodh,Amravati.
9. EGSeebauer&RobertL.Berry,2000,FundamentalsofEthicsforScientists&Engineers ,Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics(including HumanValues),EasternEconomy Edition,PrenticeHallofIndia Ltd.
11. BPBanerjee,2005,Foundationsof EthicsandManagement,ExcelBooks.
12. B LBajpai,2004,Indian Ethosand Modern Management,New RoyalBookCo., Lucknow. Reprinted 2008.

ModeofEvaluation:

Assignment/Seminar/ContinuousAssessmentTest/SemesterEndExam

COMPUTERSYSTEMSECURITY	
CourseOutcome(CO)	**Bloom's Knowledge Level (KL)**
Attheendof course,thestudentwillbeabletounderstand	

CO 1	Todiscover software bugs that pose cyber security threats and to explain how to fix the bugs tomitigatesuch threats	K_1,K_2
CO 2	Todiscovercyberattackscenariostowebbrowsersandwebserversandtoexplainhowtomitigatesuch threats	K_2
CO 3	Todiscoverandexplainmobilesoftwarebugsposingcybersecuritythreats,explainandrecreateexploits, and toexplain mitigationtechniques.	K_3
CO 4	Toarticulatetheurgentneedforcybersecurityincriticalcomputersystems,networks,andworldwideweb,andto explain variousthreatscenarios	K_4
CO 5	Toarticulatethewellknowncyberattackincidents,explaintheattackscenarios,andexplainmitigationtechniques.	K_5,K_6

DETAILEDSYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**Computer System Security Introduction**: Introduction, What is computer security and what to learn? , Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1chase. **Hijacking & Defense:** Control Hijacking ,More Control Hijacking attacks integer overflow ,MoreControlHijackingattacksformatstringvulnerabilities,DefenseagainstControlHijacking-Platform Defenses, Defense against Control Hijacking - Run-time Defenses, Advanced ControlHijackingattacks.	08
II	**ConfidentialityPolicies:**ConfinementPrinciple,DetourUnixuserIDsprocessIDsandprivileges ,Moreonconfinementtechniques,Systemcallinterposition,Error404digitalHackinginIndiapart2chase,VMbasedisolation,Confinementprinciple,Softwarefaultisolation, Rootkits ,IntrusionDetectionSystems	08
III	**Secure architecture principles isolation and leas:** Access Control Concepts , Unix and windowsaccesscontrolsummary,Otherissuesin accesscontrol,Introductionto browserisolation. **Web security landscape :**Web security definitions goals and threatmodels, HTTP contentrendering .Browser isolation .Security interface , Cookies frames and frame busting, Major webserverthreats,Crosssite requestforgery,Crosssitescripting,DefensesandprotectionsagainstXSS ,Findingvulnerabilities,Securedevelopment.	08
IV	**Basic cryptography:** Public key cryptography ,RSA public key crypto ,Digital signature Hashfunctions,Publickeydistribution,Realworldprotocols,Basicterminologies,Emailsecuritycertificates,Transport LayersecurityTLS,IP security , DNSsecurity.	08
V	**InternetInfrastructure:**Basicsecurityproblems,Routingsecurity,DNSrevisited,Summaryofweaknessesofinternetsecurity,.LinklayerconnectivityandTCPIPconnectivity,Packetfiltering firewall,Intrusiondetection.	08

Text books:

1. WilliamStallings,NetworkSecurityEssentials: ApplicationsandStandards,PrenticeHall,4thedition,2010.

2. MichaelT.GoodrichandRobertoTamassia,IntroductiontoComputer Security,AddisonWesley,2011.

3. WilliamStallings,NetworkSecurityEssentials:ApplicationsandStandards,PrenticeHall,4thedition,2010.

4. AlfredJ.Menezes,PaulC.vanOorschotandScottA.Vanstone,HandbookofAppliedCryptography,CRCPress,2001.

MappedWith:https://ict.iitk.ac.in/product/computer-system-security/

PYTHONPROGRAMMING		
CourseOutcome(CO)		**Bloom's Knowledge Level (KL)**
Attheendof course,thestudentwillbeabletounderstand		
CO1	ToreadandwritesimplePythonprograms.	K_1,K_2
CO2	TodevelopPythonprogramswithconditionalsandloops.	K_2,K_4
CO3	TodefinePythonfunctionsandto usePython datastructures-lists,tuples, dictionaries	K_3
CO4	Todoinput/outputwithfilesinPython	K_2
CO5	Todo searching,sortingand mergingin Python	K_2,K_4
DETAILEDSYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** TheProgramming CycleforPython,PythonIDE,InteractingwithPythonPrograms,ElementsofPython,TypeConversion. **Basics:**Expressions,AssignmentStatement,ArithmeticOperators,OperatorPrecedence,BooleanExpression.	**08**
II	**Conditionals:**ConditionalstatementinPython(if-elsestatement,itsworkingandexecution),Nested-ifstatementandElif statementinPython,ExpressionEvaluation&FloatRepresentation. **Loops:**Purposeandworking ofloops,Whileloopincludingitsworking,ForLoop,NestedLoops,BreakandContinue.	**08**
III	**Function:**PartsofAFunction,ExecutionofAFunction,KeywordandDefaultArguments,ScopeRules. **Strings:**LengthofthestringandperformConcatenationandRepeatoperationsinit.IndexingandSlicingofStrings. **PythonDataStructure:**Tuples,UnpackingSequences,Lists,MutableSequences,ListComprehension, Sets , Dictionaries **HigherOrderFunctions:**TreatfunctionsasfirstclassObjects,Lambda Expressions	**08**

IV	**SieveofEratosthenes:**generateprimenumberswiththehelpofanalgorithmgivenbytheGreekMathematician namedEratosthenes,whosealgorithmisknownas Sieveof Eratosthenes. **FileI/O:** FileinputandoutputoperationsinPythonProgramming **ExceptionsandAssertions** **Modules:**Introduction,ImportingModules , **AbstractDataTypes:**AbstractdatatypesandADT interfaceinPythonProgramming. **Classes:**Classdefinitionandotheroperationsintheclasses,SpecialMethods(suchas_init_, _str_,comparisonmethodsandArithmeticmethodsetc.),ClassExample,Inheritance,InheritanceandOOP.	08
V	**Iterators& Recursion:**RecursiveFibonacci,TowerOfHanoi **Search:**SimpleSearchandEstimatingSearchTime,BinarySearchandEstimatingBinarySearchTime **Sorting&Merging:** SelectionSort,MergeList,MergeSort,HigherOrderSort	08

Text books:
UpdatedforPython3,

Revisedandupdatedfor Python3.2,Network
TheoryLtd., 2011.
3.John V Guttag,—Introduction to Computation and Programming Using Python``, Revised andexpanded Edition,
MITPress, 2013
4.Robert Sedgewick, Kevin Wayne, Robert Dondero,—Introduction to Programming in Python:An Inter-
disciplinaryApproach,PearsonIndiaEducation Services Pvt. Ltd.,2016.
Budd,   -GrawHillEducation(India) PrivateLtd.,,2015.

ython:AComputational ProblemSolvingFocus,Wiley
IndiaEdition, 2013.
ComputerScience

MappedWith:https://ict.iitk.ac.in/product/python-programming-a-practical-approach/