SUDHARSAN ENGINEERING COLLEGE

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)

Sathiyamangalam, Kulathur(TK), Pudukkottai District-622 501

Ph: 04339-240830, 240840 Fax: 04339-240205

Website: **www.sec.ac.in** Email: principal@sec.ac.in

E-Box Colleges

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE OUTCOMES

As per Anna University Regulation 2017, the list of courses is given in the Table.

List of Courses

S/N	COURSE CODE (NBA)	COURSE CODE (UNIVERSITY)	TITLE OF THE COURSE
		Semester – I	
1.	C101	HS8151	Communicative English
2.	C102	MA8151	Engineering Mathematics–I
3.	C103	PH8151	Engineering Physics
4.	C104	CY8151	Engineering Chemistry
5.	C105	GE8151	Problem Solving and Python Programming
6.	C106	GE8152	Engineering Graphics

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7.	C107	GE8161	Problem Solving and Python Programming Laboratory
8.	C108	BS8161	Physics and Chemistry Laboratory
Semester – II			
9.	C109	HS8251	Technical English
10.	C110	MA8251	Engineering Mathematics–II
11.	C111	PH8251	Materials Science
12.	C112	BE8253	Basic Electrical, Electronics and Measurement Engineering
13.	C113	GE8291	Environmental Science and Engineering
14.	C114	GE8292	Engineering Mechanics
15.	C115	GE8261	Engineering Practices Laboratory
16.	C116	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory
Semester – III			
17.	C201	MA8353	Transforms and Partial Differential Equations
18.	C202	ME8391	Engineering Thermodynamics

19.	C203	CE8394	Fluid Mechanics and Machinery
20.	C204	ME8351	Manufacturing Technology – I
21.	C205	EE8353	Electrical Drives and Controls
22.	C206	ME8361	Manufacturing Technology Laboratory - I
23.	C207	ME8381	Computer Aided Machine Drawing
24.	C208	EE8361	Electrical Engineering Laboratory
25.	C209	HS8381	Interpersonal Skills / Listening & Speaking
Semester – IV			
26.	C210	MA8452	Statistics and Numerical Methods
27.	C211	ME8492	Kinematics of Machinery
28.	C212	ME8451	Manufacturing Technology – II
29.	C213	ME8491	Engineering Metallurgy
30.	C214	CE8395	Strength of Materials for Mechanical Engineers
31.	C215	ME8493	Thermal Engineering- I

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32.	C216	ME8462	Manufacturing Technology Laboratory – II
33.	C217	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory
34.	C218	HS8461	Advanced Reading and Writing
Semester – V			
35.	C301	ME8595	Thermal Engineering- II
36.	C302	ME8593	Design of Machine Elements
37.	C303	ME8501	Metrology and Measurements
38.	C304	ME8594	Dynamics of Machines
39.	C305	ORO551	Renewable Energy Sources
40.	C306	ME8511	Kinematics and Dynamics Laboratory
41.	C307	ME8512	Thermal Engineering Laboratory
42.	C308	ME8513	Metrology and Measurements Laboratory
Semester – VI			
43.	C309	ME8651	Design of Transmission Systems

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44.	C310	ME8691	Computer Aided Design and Manufacturing
45.	C311	ME8693	Heat and Mass Transfer
46.	C312	ME8692	Finite Element Analysis
47.	C313	ME8694	Hydraulics and Pneumatics
48.	C314	ME8091	Automobile Engineering
49.	C315	ME8681	CAD / CAM Laboratory
50.	C316	ME8682	Design and Fabrication Project
51.	C317	HS8581	Professional Communication
Semester – VII			
52.	C401	ME8792	Power Plant Engineering
53.	C402	ME8793	Process Planning and Cost Estimation
54.	C403	ME8791	Mechatronics
55.	C404	OIE751	Robotics
56.	C405	ME8073	Unconventional Machining Process

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57.	C406	ME8097	Non Destructive Testing
58.	C407	ME8711	Simulation and Analysis Laboratory
59.	C408	ME8781	Mechatronics Laboratory
60.	C409	ME8712	Technical Seminar
Semester – VIII			
61.	C410	MG8591	Principles of Management
62.	C411	IE8693	Production Planning and Control
63.	C412	ME8811	Project Work

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E-Box
Colleges

SEMESTER 1

Course Code & Name: C101 & HS8151 - Communicative English		
	CO Statements	**Knowledge Level**
The students should be able to		
C101.1	**Enhance** their reading and technical writing skills in the first year itself.	K2
C101.2	**Read** comfortably and understand articles in science and engineering journals and articles in dailies.	K2
C101.3	**Get** themselves involved in an active manner during informal conversations, state opinions and express willingness.	K3
C101.4	**Communicate** effectively in short conversations and talks uttered in English.	K4
C101.5	**Draft** essays related to their courses and write personal letters and emails in comfortable manner for lifelong learning.	K4

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Course Code &Name: C102 & MA8151 - Engineering Mathematics - I		
	CO Statements	**Knowledge Level**
The students should be able to		
C102.1	**Analyze** and **apply** the Engineering knowledge in differentiation to solve maxima and minima problems.	K4
C102.2	**Solve** the problems of integrals using different methods of calculus.	K5
C102.3	**Design** and **develop** the problems of integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.	K6
C102.4	**Analyze** the problems of integrals by using various methods of integration, such as substitution, partial fractions, and integration by	K4
C102.5	**Apply** various tools in solving the differential equations to recognize the need	K3

Course Code &Name: C103 & PH8151 Engineering Physics		
	CO Statements	**Knowledge Level**
The students should be able to		
C103.1	**Analyze** the problems in columns and beams and gain the engineering knowledge in properties of matter to formulate.	K4
C103.2	**Explain** the fundamental concepts and applications of waves, lasers, and fiber optics to give theoretical approaches to design modern devices.	K2
C103.3	**Interpret** the knowledge in thermal properties of materials and can determined expansion joints and heat exchangers in devices.	K3
C103.4	**Discuss** the fundamental concepts of quantum theory and how modern electron microscope techniques use it to make predictions in the field of	K2
C103.5	**Describe** the behavior of solids, describe the fundamentals of crystals, their structures, and the various crystal development processes.	K2

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Course Code &Name: C104 & CY8151 Engineering Chemistry	
CO Statements	**Knowledge Level**
The students should be able to	
C104.1 **Apply** the water treatment techniques water in the industries and domestic water using the latest techniques by using engineering knowledge.	K3
C104.2 **Select** the adsorption methods used in the field of water and air pollution purification to assess societal, health, safety, and cultural issues in the environmental.	K2
C104.3 **Explain** the significance of alloying and the behavior of one component and two component systems using phase diagram and apply appropriate techniques in the field of metallurgy.	K2
C104.4 **Discuss** the types of fuels, calorific value calculations, and analyze the need for alternative fuels to solve current social problems by using engineering	K4
C104.5 **Review** the principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells with appropriate consideration for the	K2

Course Code &Name: C105 &GE8151 Problem Solving and Python Programming		
	CO Statements	**Knowledge Level**
The students should be able to		
C105.1	**Express** the concepts of computational thinking and algorithmic problem-solving techniques.	K2
C105.2	**Develop** simple python programs for applying the concepts of data types, expressions, and python statements.	K3
C105.3	**Develop** Python programs for solving real-time computational problems by using conditionals, looping, functions, and strings.	K3
C105.4	**Explain** the concepts of compound data using Python lists, tuples, and dictionaries.	K2
C105.5	**Develop** python programs for solving computational problems by using modules, files, and python packages.	K3

Course Code and Name: C106 & GE8152 Engineering Graphics		
	CO Statements	**Knowledge Level**
The students should be able to		
C106.1	**Sketch** the conic sections, special curves, and draw orthographic views from pictorial views and models.	K4
C106.2	**Apply** the principles of orthographic projections of points in all quadrants, lines, and planes in first quadrant.	K3
C106.3	**Sketch** the projections of simple solids like prisms, pyramids, cylinder, and cone and obtain the traces of plane figures.	K4
C106.4	**Practice** the sectional views of solids like cube, prisms, pyramids, cylinders &cones and extend its lateral surfaces.	K3
C106.5	**Sketch** the perspective projection of simple solids, truncated prisms, pyramids, cone, and cylinders and sketch the isometric projection of simple	K4

Course Code and Name: C107 & GE8161 Problem Solving and Python Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C107.1	**Develop** simple python programs for applying the concepts of data types, expressions, and python statements.	K3
C107.2	**Develop** Python programs using conditionals, looping, functions, and strings for solving real-time computational problems.	K3
C107.3	**Explain** the concepts of compound data using Python lists, tuples, and	K2
C107.4	**Develop** python programs for solving problems by using modules, files, and python packages.	K3
C107.5	**Utilize** Python packages for developing real-world software applications.	K6

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Course Code and Name: C108 & BS8161 Physics and Chemistry Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C108.1	**Manipulate** the fundamental concepts like torque, elasticity and bending moment of beams for various engineering applications by the determination of rigidity modulus of the wire and young's modulus of the material of the beam by non- uniform bending.	K3
C108.2	**Practice** the fundamentals of thermal properties of material of the bad conductor	K3
C108.3	**Apply** the basic knowledge and estimation of DO content in water sample by	K2
C108.4	**Dramatize** the strength of an acid using pH meter and conductometer for applications in the field of engineering.	K3
C108.5	**Experimenting** the estimation of total, permanent and temporary hardness of water for our environment.	K3

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E-Box Colleges

SEMESTER 2

Course Code and Name: C109 & HS8251 Technical English		
	CO Statements	**Knowledge Level**
The students should be able to		
C109.1	**Read** and write their technical and area-specific texts in an effortless manner.	K3
C109.2	**Listen** comfortably and respond confidently to lectures and talks pertaining to their domain skills.	K2
C109.3	**Speak** in an appropriate manner in both formal and informal situations for lifelong learning.	K3
C109.4	**Create** CVs and draft Job applications in confident manner.	K6
C109.5	**Communicate** confidently by using all the four skills with their peers and in real life situations.	K4

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Course Code and Name: C110 & MA8251 Engineering Mathematics -II		
	CO Statements	**Knowledge Level**
The students should be able to		
C110.1	**Analyze** the different types of matrices for solving practical problems.	K4
C110.2	**Apply** Gradient, divergence and curl of a vector point function and related identities in engineering field.	K3
C110.3	**Acquire** the knowledge to solve the engineering problems in analytic functions.	K2
C110.4	**Analyze** and **apply** the different methods to solve complex integration problems.	K4
C110.5	**Create** and manage the projects after applying and analyzing the fundamentals of Laplace transforms.	K6

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Course Code and Name: C111 & PH8251 Materials Science		
	CO Statements	**Knowledge Level**
The students should be able to		
C111.1	**Inferring** the fundamental knowledge in phase diagrams and explains its application in the field of materials science and engineering.	K2
C111.2	**Interpret** the fundamentals of the Fe-Fe3C phase diagram, diverse microstructures, and alloys for engineering designs.	K3
C111.3	**Describe** the fundamental mechanical properties of materials and their methods of measurement.	K2
C111.4	**Interpret** the properties of magnetic and dielectric materials, manipulate them, and then analyze them for the purposes for which they are used in modern	K3
C111.5	**Comprehend** the basics of ceramics, composites, and nanomaterials to design modern devices.	K2

Course Code and Name: C112 & BE8253 Basic Electrical, Electronics and Measurement Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C112.1	**Explain** the operation of three phase electrical circuits and power systems.	K2
C112.2	**Apply** their knowledge of AC circuits by interpreting waveforms, calculating RMS values.	K3
C112.3	**Recall** and **comprehend** the principles of operation and characteristics of DC machines and transformers.	K2
C112.4	**Explain** the principles and characteristics of electronic devices and circuits.	K2
C112.5	**Explain** the concepts of measurements and instruments for real time applications.	K2

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Course Code and Name: C113 & GE8291 Environmental Science and Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C113.1	**Apply** the finding and implementing scientific, technological, economic and political solutions to environmental problems with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	K3
C113.2	**Comment** the impact of the professional engineering solutions in societal and environmental contexts for the importance of public participation in conservation of natural resources.	K2
C113.3	**Discuss** the types of natural energy sources and analyze the need for alternative fuels to solve current social problems by using engineering	K2
C113.4	**Describe** the concepts from unsustainable to sustainable development and urban problems related to energy, water conservation, rain water harvesting.	K2
C113.5	**Apply** the basics of information technology in environment and human health function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	K3

Course Code and Name: C114 & GE8292 Engineering Mechanics		
	CO Statements	**Knowledge Level**
The students should be able to		
C114.1	**Illustrate** the vector and scalar representation of forces and moments.	K3
C114.2	**Analyse** the rigid body in equilibrium.	K4
C114.3	**Evaluate** the properties of surfaces and solids.	K5
C114.4	**Calculate** dynamic forces exerted in rigid body.	K3
C114.5	**Determine** the friction and the effects by the laws of friction.	K3

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Course Code and Name: C115 & GE8261 Engineering Practices Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C115.1	**Fabricate** carpentry joints.	K6
C115.2	**Use** Welding equipment's to join the structures.	K3
C115.3	**Perform** sheet metal works.	K6
C115.4	**Perform** basic fitting operations and plumbing.	K3
C115.5	**Carry** out basic home electrical works and appliances.	K3

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Course Code and Name: C116 & BE8261 Basic Electrical, Electronics and Instrumentation Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C116.1	**Comprehend** the electrical circuit and their working principles.	K2
C116.2	**Identify** the electrical components of a machines and their applications.	K2
C116.3	**Illustrate** the characteristics of various electronic devices.	K2
C116.4	**Explore** the basics concepts in design of digital circuits.	K2
C116.5	**Explain** the fundamentals of communication systems.	K2

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E-Box Colleges

SEMESTER 3

Course Code and Name: C201 & MA8353 Transforms and Partial Differential Equations		
	CO Statements	**Knowledge Level**
The students should be able to		
C201.1	**Solve** the given standard partial differential equations.	K3
C201.2	**Identify** and analyze the differential equations using Fourier series analysis in engineering applications.	K4
C201.3	**Apply** modern techniques of Fourier series to solve one- and two-dimensional heat flow problems and one-dimensional wave equations	K3
C201.4	**Apply** the engineering knowledge to manage the projects in transforms and partial differential equations to formulate and solve some of the physical	K3
C201.5	**Use** the effective modern mathematical tools to solve the partial differential equations by using Z transform techniques for discrete time	K3

Course Code and Name: C202 & ME8391 Engineering Thermodynamics		
	CO Statements	**Knowledge Level**
The students should be able to		
C202.1	**Apply** the first law of thermodynamics to calculate the property changes in closed and open engineering systems.	K3
C202.2	**Apply** the second law of thermodynamics to calculate entropy and availability in open and closed systems.	K3
C202.3	**Use** the property tables to identify the correct properties of pure substances and apply Rankine cycle to steam power plant.	K3
C202.4	**Derive** thermodynamic relations of ideal and real gases.	K3
C202.5	**Calculate** the properties of gas mixtures and moist air and its use in psychometric processes.	K3

Course Code and Name: C203 & CE8394 Fluid Mechanics and Machinery		
	CO Statements	**Knowledge Level**
The students should be able to		
C203.1	**Apply** mathematical knowledge to predict the properties of fluids and flow characteristics.	K3
C203.2	**Analyze** and calculate major and minor losses associated with pipe flow in piping networks.	K4
C203.3	**Develop** dimensional parameters and use the dynamic similitude.	K3
C203.4	**Analyse** the performance of pumps and design the centrifugal and reciprocating pumps.	K4
C203.5	**Analyse** the performance of turbines and design the various types of turbines.	K4

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Course Code and Name: C204 & ME8351 Manufacturing Technology - I		
	CO Statements	**Knowledge Level**
The students should be able to		
C204.1	**Describe** special casting processes and sand testing methods.	K2
C204.2	**Differentiate** the various welding process and its application.	K2
C204.3	**Classify** the hot working and cold working operation and its rolling defect.	K2
C204.4	**Explain** sheet metal characteristics and various special forming processes.	K2
C204.5	**Compare** thermoplastic and thermosetting plastic and its manufacturing methods.	K2

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Course Code and Name: C205 & EE8353 Electrical Drives and Control		
	CO Statements	**Knowledge Level**
The students should be able to		
C205.1	**Illustrate** heating and cooling curves with factors influencing the choice of electrical drives	K2
C205.2	**Explain** different types of electrical machines and their performances.	K2
C205.3	**Employ** various starting methods in electrical motors.	K2
C205.4	**Apply** various methods adopted in conventional and solid state speed control of DC drives.	K2
C205.5	**Use** various methods adopted in conventional and solid state speed control of AC drives.	K4

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Course Code and Name: C206 & ME8361 Manufacturing Technology Laboratory – 1		
	CO Statements	**Knowledge Level**
The students should be able to		
C206.1	**Demonstrate** the safety precautions exercised in the mechanical workshop.	K3
C206.2	**Make** the work piece as per given shape and size using lathe, shaper, planner.	K6
C206.3	**Apply** the knowledge to join two metals using arc welding.	K3
C206.4	**Apply** the knowledge of sheet metal fabrication tools and make simple tray and funnel.	K3
C206.5	**Identify** the different moulding tools, patterns and prepare sand moulds.	K2

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Course Code and Name: C207 & ME8381 Computer Aided Machine Drawing		
	CO Statements	Knowledge Level
The students should be able to		
C207.1	**Apply** the drawing standards, Fits and Tolerances.	K3
C207.2	**Re-create** part drawings, sectional views, and assembly drawings as per standards.	K3
C207.3	**Apply** Indian Standards on drawing practices and standard components to create or modify technical drawings in accordance with established guidelines.	K3
C207.4	**Apply** knowledge to create sketch drawings of machine components manually.	K3
C207.5	**Construct** drawings using standard CAD packages.	K3

Course Code and Name: C208 & EE8361 Electrical Engineering Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C208.1	**Determine** the load characteristics of various DC motors and Generators.	K3
C208.2	**Draw** the equivalent circuit of transformer.	K2
C208.3	**Predetermine** the voltage regulation of an alternator.	K3
C208.4	**Sketch** the characteristics of three phase synchronous and induction motors.	K2
C208.5	**Differentiate** various types of D.C. and A.C. motor starters.	K4

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Course Code and Name: C209 & HS8381 Interpersonal Skills / Listening & Speaking		
	CO Statements	**Knowledge Level**
The students should be able to		
C209.1	**Listen** and react to English in an appropriate manner.	K2
C209.2	**Get** themselves actively involved in Group Discussion activities.	K3
C209.3	**Demonstrate** confidence in delivering oral presentations.	K3
C209.4	**React** well in both formal and informal contexts in professional situations.	K4
C209.5	**Persuade** their audience by making appropriate expressions.	K5

SEMESTER 4

Course Code and Name: C210 & MA8452 Statistics and Numerical Methods		
	CO Statements	**Knowledge Level**
The students should be able to		
C210.1	**Apply** the concept of testing of hypothesis for small and large samples to manage projects.	K3
C210.2	**Analyze** the basic concepts of classifications of design of experiments to real life problems.	K4
C201.3	**Analyze** the basic concepts and techniques of solving algebraic and transcendental equations.	K4
C201.4	**Apply** the numerical techniques of interpolation and error approximations in various intervals in real life situations.	K3
C210.5	**Apply** the engineering knowledge to solve the differentiation and integration problems.	K3

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Course Code and Name: C211 & ME8492 Kinematics of Machinery		
	CO Statements	**Knowledge Level**
The students should be able to		
C211.1	**Explain** the principles of kinematic pairs, chains, and their classification, DOF, inversions, and basics of mechanisms.	K2
C211.2	**Analyze** the planar mechanisms for position, velocity, and acceleration.	K3
C211.3	**Design** and synthesize the cam mechanism for specified kinematic conditions.	K3
C211.4	**Explain** the basic concepts of toothed gearing and kinematics of gear trains.	K3
C211.5	**Solve** the Problems related with friction and its applications in machine elements like belt and rope drives brakes and clutches.	K3

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E-Box Colleges

Course Code and Name: C212 & ME8451 Manufacturing Technology - II		
	CO Statements	**Knowledge Level**
The students should be able to		
C212.1	**Apply** milling machine operations to accurately produce complex contours, spur and helical gears.	K3
C212.2	**Demonstrate** the gear making proficiency in milling, hobbing and gear shaping machine tools.	K3
C212.3	**Apply** surface grinding techniques for achieving flat, cylindrical smooth surfaces and tool angles using grinding machines.	K3
C212.4	**Execute** experiments to measure cutting forces in milling and turning processes.	K3
C212.5	**Develop** CNC part programs using appropriate codes and commands.	K6

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Course Code and Name: C213 & ME8491 Engineering Metallurgy		
	CO Statements	**Knowledge Level**
The students should be able to		
C213.1	**Explain** alloys and phase diagram, Iron-Iron carbon diagram and steel classification.	K2
C213.2	**Discuss** isothermal transformation, continuous cooling diagrams and different heat treatment processes.	K3
C213.3	**Clarify** the effect of alloying elements on ferrous and non-ferrous metals.	K2
C213.4	**Summarize** the properties and applications of non-metallic materials.	K2
C213.5	**Compute** the testing of mechanical properties.	K2

Course Code and Name: C214 & CE8395 Strength of Materials for Mechanical Engineers		
	CO Statements	**Knowledge Level**
The students should be able to		
C214.1	**Describe** the mechanical behavior of materials under stress with axial load, thermal load and compute the principal stress and principal strain by Mohr's circle.	K3
C214.2	**Calculate** the shear force and bending moment for the different types of beams with various types of loading condition.	K3
C214.3	**Use** the concept of deflection of beams by various methods.	K3
C214.4	**Explain** the concept of torsional behavior of materials with various configuration and also combine the deflection and torsional behavior of helical springs, carriage springs.	K3
C214.5	**Apply** the biaxial state of stress concept on thin and thick cylinders.	K3

Course Code and Name: C215 & ME8493 Thermal Engineering - I		
	CO Statements	**Knowledge Level**
The students should be able to		
C215.1	**Apply** thermodynamic concepts for analysis of different air standard cycles and compare their performance.	K4
C215.2	**Discuss** different types of air compressors and **solve** problems related to their efficiencies.	K2
C215.3	**Explain** the working of IC engines and combustion phenomenon and perform calculations on air-fuel mixture.	K3
C215.4	**Compute** the performance parameters of engines and explain the working of different types of fuel injection, ignition, and cooling systems.	K4
C215.5	**Explain** gas turbine cycle analysis and ways of improving its performance.	K4

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Course Code and Name: C216 & ME8462 - Manufacturing Technology Laboratory -II	
CO Statements	**Knowledge Level**
The students should be able to	
C216.1	**Apply** milling machine operations to accurately produce complex contours, spur, and helical gears.	K3
C216.2	**Demonstrate** the gear making proficiency in milling, hobbing and gear shaping machine tools.	K3
C216.3	**Apply** surface grinding techniques for achieving flat, cylindrical smooth surfaces and tool angles using grinding machines.	K3
C216.4	**Execute** experiments to measure cutting forces in milling and turning processes.	K3
C216.5	**Develop** CNC part programs using appropriate codes and commands.	K6

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Course Code and Name: C217 & CE8381 Strength of Materials and Fluid Mechanics and Machinery Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C217.1	**Determine** the tensile, torsion and hardness properties of metals by testing.	K4
C217.2	**Determine** the stiffness properties of helical and carriage spring.	K4
C217.3	**Apply** the conservation laws to determine the coefficient of discharge of a venturimeter and finding the friction factor of given pipe.	K3
C217.4	**Apply** the fluid static and momentum principles to determine the metacentric height and forces due to impact of jet.	K3
C217.5	**Determine** the performance characteristics of turbine, rotodynamic pump and Positive displacement pump.	K4

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Course Code and Name: C218 & HS8461 Advanced Reading and Writing		
	CO Statements	**Knowledge Level**
The students should be able to		
C218.1	**Write** technical articles in a confident manner.	K3
C218.2	**Create** their CV and write cover letter without anyone's help.	K6
C218.3	**Read** and express their views critically.	K2
C218.4	**Exhibit** their critical wisdom in varied professional situations.	K3
C218.5	**Write** confidently by acquiring competency in writing skills and use them in academic situations forever.	K5

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E-Box Colleges

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Course Code and Name: C301 & ME8595 Thermal Engineering II		
	CO Statements	**Knowledge Level**
The students should be able to		
C301.1	**Apply** the thermodynamic concepts for steam nozzles and solve problems.	K3
C301.2	**Explain** the functioning of different types of boilers, auxiliaries and calculate performance parameters	K3
C301.3	**Explain** the flow in steam turbines, draw velocity triangles and solve problems	K3
C301.4	**Explain** the working of heat pumps and heat exchangers and summarize the concept of cogeneration.	K5
C301.5	**Describe** the working of refrigeration and air conditioning systems and perform cooling load calculations.	K4

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Course Code and Name: C302 & ME8593 Design of Machine Elements		
	CO Statements	**Knowledge Level**
The students should be able to		
C302.1	**Apply** the knowledge of mathematics fundamentals in the influence of steady and variable stresses in machine component design.	K3
C302.2	**Design** solutions for complex engineering problems to design to shafts, keys and couplings.	K4
C302.3	**Identify** and apply the concepts of design to temporary and permanent joints.	K1
C302.4	**Apply** the concepts of design to energy absorbing members, connecting rod and crank shaft.	K3
C302.5	**Apply** the concepts of design to bearings.	K3

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Course Code and Name: C303 & ME8501 Metrology and Measurements		
	CO Statements	**Knowledge Level**
The students should be able to		
C303.1	**Describe** the concepts of measurements to apply in various metrological instruments	K2
C303.2	**Outline** the principles of linear and angular measurement tools used for industrial applications	K3
C303.3	**Explain** the procedure for conducting computer aided inspection	K2
C303.4	**Demonstrate** the techniques of form measurement used for industrial components	K3
C303.5	**Discuss** various measuring techniques of mechanical properties in industrial applications	K2

Course Code and Name: C304 & ME8594 Dynamics of Machines		
	CO Statements	**Knowledge Level**
The students should be able to		
C304.1	**Discuss** the forces required by various machine components to overcome inertia	K3
C304.2	**Compute** the unbalanced forces on reciprocating and rotating masses.	K3
C304.3	**Distinguish** the types of vibration and its effect on the system.	K3
C304.4	**Associate** the system response an exposure to various forced vibrations.	K3
C304.5	**Explain** the control mechanisms of governor and gyroscope with their applications.	K3

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Course Code and Name: C305 & ORO551 Renewable Energy Sources	
CO Statements	**Knowledge Level**
The students should be able to	

	CO Statements	Knowledge Level
The students should be able to		
C305.1	**Understanding** the physics of solar radiation.	K2
C305.2	**Examine** ability to classify the solar energy collectors and methodologies of storing solar energy.	K2
C305.3	**Apply** solar energy in a useful way.	K3
C305.4	**Outline** knowledge in wind energy and biomass with its economic	K3
C305.5	**Analyz**e knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies.	K4

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Course Code and Name: C306 & ME8511 Kinematics and Dynamics Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C306.1	**Investigate** the gear parameters of various types of gears and gear trains, and measure their characteristics.	K4
C306.2	**Compute** the gyroscopic couple in gyroscope and centrifugal force in various governors.	K3
C306.3	**Determine** mass moment of inertia of mechanical element, natural frequency and damping coefficient and transmissibility.	K4
C306.4	**Discuss** the kinematic working model of various mechanism and cam profile.	K2
C306.5	**Compute** the torsional frequency and critical speed of shafts.	K3

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Course Code and Name: C307 & ME8512 Thermal Engineering Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C307.1	**Determine** the valve timing and port timing diagram of an IC engines.	K2
C307.2	**Compute** the property of fuels and lubricating oils using suitable tests.	K4
C307.3	**Analyse** the performance and energy balance test on engine, boiler, and turbine.	K4
C307.4	**Examine** the heat transfer coefficient in modes of natural and forced convection.	K4
C307.5	**Demonstrate** Effectiveness and COP of various refrigeration and air conditioning systems.	K3

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Course Code and Name: C308 & ME8513 Metrology and Measurement Laboratory	

	CO Statements	Knowledge Level
The students should be able to		
C308.1	**Measure** the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque, and vibration.	K4
C308.2	**Calibrate** the Vernier, micrometer and slip gauges and setting up the comparator for the inspection.	K4
C308.3	**Measure** the components precisely using non-contact (optical) measurement system.	K4
C308.4	**Demonstrate** the functions of surface roughness tester for measuring complex profiles.	K3
C308.5	**Explain** the machine tool metrology equipments with its measuring technique like straightness using auto collimator, precision level using spindle tests.	K4

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E-Box Colleges

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Course Code and Name: C309 & ME8651 Design of Transmission Systems		
	CO Statements	**Knowledge Level**
The students should be able to		
C309.1	**Apply** the knowledge of fundamentals and concepts of design to belts, chains and rope drives.	K3
C309.2	**Apply** the concepts of design to spur, helical gears.	K4
C309.3	**Apply** the concepts of design to worm and bevel gears	K4
C309.4	**Apply** the concepts of design to gear boxes.	K4
C309.5	**Apply** the concepts of design to cams, brakes, and clutches.	K3

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Course Code and Name: C310 & ME8691 Computer Aided Design and Manufacturing		
	CO Statements	**Knowledge Level**
The students should be able to		
C310.1	**Explain** the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics	K2
C310.2	**Design** representation the fundamentals of parametric curves, surfaces, and Solids	K2
C310.3	**Summarize** the different types of Standard systems used in CAD	K2
C310.4	**Associate** the concepts of NC& CNC programming to develop part programme for Lathe & Milling Machines	K2
C310.5	**Summarize** the different types of techniques used in Cellular Manufacturing and FMS.	K2

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Course Code and Name: C311 & ME8693 Heat and Mass Transfer		
	CO Statements	**Knowledge Level**
The students should be able to		
C311.1	**Apply** heat conduction equations to solve real life problems in steady state and transient conditions.	K3
C311.2	**Apply** free and forced convective heat transfer correlations to solve problems in internal and external flows through/over various surface configurations	K3
C311.3	**Explain** the phenomena of boiling and condensation and design different types of heat exchanger.	K3
C311.4	**Explain** basic laws for radiation and apply to radiative heat transfer between different types of surfaces to solve numerical problems	K3
C311.5	**Apply** diffusive and convective mass transfer equations and correlations to solve problems for different applications	K3

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Course Code and Name: C312 & ME8692 Finite Element Analysis		
	CO Statements	**Knowledge Level**
The students should be able to		
C312.1	**Summarize** the basics of finite element formulation.	K2
C312.2	**Apply** finite element formulations to solve one dimensional Problem.	K3
C312.3	**Apply** finite element formulations to solve two dimensional scalar Problems	K3
C312.4	**Apply** finite element method to solve two-dimensional Vector problems.	K4
C312.5	**Apply** finite element method to solve problems on iso parametric element and dynamic Problems.	K2

Course Code and Name: C313 & ME8694 Hydraulics and Pneumatics		
	CO Statements	**Knowledge Level**
The students should be able to		
C313.1	**Explain** the Fluid power and operation of different types of pumps.	K2
C313.2	**Summarize** the features and functions of Hydraulic motors, actuators, and Flow control valves.	K2
C313.3	**Discuss** the different types of Hydraulic circuits and systems.	K2
C313.4	**Explain** the working of different pneumatic circuits and systems.	K4
C313.5	**Summarize** the various trouble shooting methods and applications of hydraulic and pneumatic systems.	K3

Course Code and Name: C314 & ME8091 Automobile Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
C314.1	**Recognize** the various parts of the automobile and their functions and materials.	K2
C314.2	**Discuss** the engine auxiliary systems and engine emission control.	K2
C314.3	**Distinguish** the working of different types of transmission systems.	K2
C314.4	**Explain** the Steering, Brakes and Suspension Systems.	K2
C314.5	**Predict** possible alternate sources of energy for IC Engines	K4

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Course Code and Name: C315 & ME8681 CAD/CAM Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C315.1	**Design** different parts of mechanical equipment's.	K4
C315.2	**Apply** skills in various designing and manufacturing industries.	K3
C315.3	**Create** 2D and 3D models using modeling software's.	K6
C315.4	**Make** appropriate selection of CAD functionality to use as tools in the design process.	K4
C315.5	**Demonstrate** manual part programming with G and M codes using CAM.	K2

Course Code and Name: C316 & ME8682 Design and Fabrication Project		
	CO Statements	**Knowledge Level**
The students should be able to		
C316.1	**Remember** the basic principles of mechanical engineering in design of component	K1
C316.2	**Describe** the manufacturing process for fabrication of designed component.	K2
C316.3	**Apply** the ethical principles in drafting of project report.	K3
C316.4	**Analyze** the functionality of the fabricated component.	K4
C316.5	**Evaluate** the communication of individual and team on technical information.	K5

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Course Code and Name: C317 & HS8581 Professional Communication		
	CO Statements	**Knowledge Level**
The students should be able to		
C317.1	**Talk** in English in real life situations.	K3
C317.2	**Make** effective presentations.	K3
C317.3	**Participate** in GD and contribute ideas with ease.	K3
C317.4	**Master** soft skills required for the work place.	K3
C317.5	**Write** letters and technical writing.	K3

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SEMESTER 7

Course Code and Name: C401 & ME8792 Power Plant Engineering	
CO Statements	**Knowledge Level**
The students should be able to	
C401.1 **Discuss** the layout, construction and working of the components inside a thermal power plant.	K2
C401.2 **Explain** the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.	K2
C401.3 **Discuss** the layout, construction and working of the components inside nuclear power plants.	K2
C401.4 **Summarize** the working and construction of the components inside Renewable energy power plants.	K2
C401.5 **Explain** the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.	K2

Course Code and Name: C402 & ME8793 Process Planning and Cost Estimation		
	CO Statements	**Knowledge Level**
The students should be able to		
C402.1	**Enumerate** the activities involved in the Production Planning and Control function.	K2
C402.2	**Explain** the significance and applications of work study techniques.	K2
C402.3	**Describe** the process planning activities with reference to production control.	K2
C402.4	**Discuss** the concepts of production scheduling.	K2
C402.5	**Explain** different types of costs in inventory system.	K2

Course Code and Name: C403 & ME8791 Mechatronics		
	CO Statements	**Knowledge Level**
The students should be able to		
C403.1	**Discuss** the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronics Systems and sensor technology.	K3
C403.2	**Discuss** the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing modes of Microprocessor and Microcontroller.	K2
C403.3	**Discuss** Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing.	K3
C403.4	**Explain** the architecture, programming, and application of programmable logic controllers to problems and challenges in the areas of mechatronics	K3
C403.5	**Discuss** various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies.	K3

Course Code and Name: C404 & OIE751 Robotics		
	CO Statements	**Knowledge Level**
The students should be able to		
C404.1	**Explain** the concepts of industrial robots, classification, specifications, and coordinate systems. Also summarize the need and application of robots in different sectors.	K3
C404.2	**Illustrate** the different types of robot drive systems as well as robot end effectors.	K3
C404.3	**Apply** the different sensors and image processing techniques in robotics to improve the ability of robots.	K3
C404.4	**Develop** robotic programs for different tasks and familiarize with the kinematics motions of robot.	K3
C404.5	**Examine** the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.	K3

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Course Code and Name: C406 & ME8073 Unconventional Machining Processes		
	CO Statements	**Knowledge Level**
The students should be able to		
C405.1	**Explain** the need for unconventional machining processes and its classification.	K2
C405.2	**Compare** various thermal energy and electrical energy based unconventional machining processes.	K2
C405.3	**Summarize** various chemical and electro-chemical energy based unconventional machining processes.	K3
C405.4	**Explain** various nano abrasives based unconventional machining processes.	K3
C405.5	**Distinguish** various recent trends based unconventional machining processes.	K3

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Course Code and Name: C406.1 & ME8097 Non Destructive Testing		
	CO Statements	**Knowledge Level**
The students should be able to		
C406.1	**Explain** the fundamental concepts of NDT	K2
C406.2	**Discuss** the different methods of NDE	K2
C406.3	**Explain** the concept of Thermography and Eddy current testing	K2
C406.4	**Explain** the concept of Ultrasonic Testing and Acoustic Emission	K2
C406.5	**Explain** the concept of Radiography	K2

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Course Code and Name: C407 & ME8711 Simulation and Analysis Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C407.1	**Analyze** the forces and stress in trusses, cables, beams, plates, axis-symmetric components with different boundary conditions.	K4
C407.2	**Compute** the temperature distribution in plates and cylindrical shells.	K3
C407.3	**Perform** the vibration, modal and harmonic analysis of simple system.	K3
C407.4	**Comprehend** the basic functions and interface of MATLAB.	K2
C407.5	**Synthesis** and **simulation** of mechanism using MATLAB software.	K4

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Website: **www.sec.ac.in** Email: principal@sec.ac.in

E-Box Colleges

Course Code and Name: C408 & ME8781 Mechatronics Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
C408.1	**Write** and **execute** the assembly language programming in microprocessor 8085.	K3
C408.2	**Demonstrate** the interface between microprocessor and external devices.	K3
C408.3	**Design**, model, analysis of mechatronics system with various pneumatic, hydraulic electrical and PLC system.	K3
C408.4	**Explain** the application of image processing.	K2
C408.5	**Understand** the functions of transducers.	K2

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Course Code and Name: C409 & ME8712 Technical Seminar		
	CO Statements	**Knowledge Level**
The students should be able to		
C409.1	**Recollect** the knowledge acquired during the earlier semesters.	K2
C409.2	**Apply** fundamental principle of mechanical engineering concepts to solve real life problems.	K3
C409.3	**Present** technical topics and discuss about them.	K2
C409.4	**Analyze** and interpret experimental data with relevance.	K2
C409.5	**Simplify** the decision-making skills.	K2

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SEMESTER 8

Course Code and Name: C410 & MG8591 Principles of Management		
	CO Statements	**Knowledge Level**
The students should be able to		
C410.1	**Explain** the purpose of management, roles and skills of Manager in local and global organization.	K2
C410.2	**Describe** the purpose of planning, decision making and their processes.	K2
C410.3	**Demonstrate** the various organizational structures and staff selection procedure.	K2
C410.4	**Classify** the motivational theories and communication process	K2
C410.5	**Describe** the scope of control and role of computer, IT in management control.	K2

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Course Code and Name: C411 & IE8693 Production Planning and Control		
	CO Statements	**Knowledge Level**
The students should be able to		
C411.1	**Enumerate** the activities involved in the production planning and control function.	K2
C411.2	**Explain** the significance and applications of work study techniques.	K2
C411.3	**Describe** the process planning activities with reference to production control.	K2
C411.4	**Discuss** the concepts of production scheduling.	K2
C411.5	**Explain** different types of costs in inventory system.	K2

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Course Code and Name: C412 & ME8811 Project Work		
	CO Statements	**Knowledge Level**
The students should be able to		
C412.1	**Formulate** a real-world problem, identify the requirement and develop the design solutions.	K3
C412.2	**Identify** technical ideas, strategies, and methodologies.	K3
C412.3	**Utilize** the new tools, algorithms, techniques that contribute to obtain the solution of the project.	K3
C412.4	**Test** and validate through conformance of the developed prototype and analysis the cost effectiveness.	K4
C412.5	**Prepare** technical report and oral presentations	K3